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ELECTRIC RAILWAY TRACTION

A Supplement illustrating and describing developments in Electric Railway Traction is presented with each copy of this week's issue.

The G.W.R. and the New Works Scheme

FOLLOWING the brief outline, based on a Treasury statement, which we published last week concerning the £30,000,000 scheme for railway improvements, the G.W.R. has issued various amplifying particulars as to its share of the plans. These are abstracted on page 840. It will be recalled that the agreement with the Government provides for a guarantee by the Exchequer of the principal and interest of a loan to the railway companies to be raised at something like the prevalent rate of interest and on more favourable terms than could otherwise be obtained by the companies themselves. The G.W.R. adds that, while its schemes are desirable developments towards the maintenance of an efficient and economic service to the public, and should, therefore, be of ultimate benefit to the shareholders, many of the major works will require Parliamentary powers and cannot be expected to become fully remunerative for many years. For this reason the provision of a loan at a lower rate of interest than was otherwise obtainable was an essential condition for the works being undertaken. The improvements contemplated are spread over a very wide area and should contribute materially to the relief of unemployment. Special consideration will be given by the G.W.R. to South Wales in the placing of orders, and benefit should accrue from the large orders for steel rails, &c., which in accordance with the company's usual practice will be obtained mainly from that locality.

* * * *

The Calculus of Plenty

Sir Josiah Stamp, in his paper last Wednesday to the British Science Guild, entitled as above, examined the slogan "poverty in the midst of plenty." Is there really plenty, and if so to what extent can it be used? Can it be measured? What is "plenty" anyway? Now, in this matter, certain considerations should never be forgotten, such as what the object of production is. Can we agree that the aim of production is consumption? Then we ought to be clear that the *real* cost of production is consumption, *i.e.*, that which is consumed or destroyed in production. The cost of the mustard tree is the seed from which it sprang. Any symbolism or system of accountancy which does not truly reflect real, hard facts is faulty and should be put right. There is a temptation sometimes to try to make facts fit figures, instead of making figures reflect facts. Definitions, too, are important. A concise definition of production is the conversion of raw materials into commodities by the application of energy. What then is the limit of production, bearing in mind what raw materials are and that they are virtually unlimited? The limit of production is man's ability to harness energy—and there is no sign that that has been reached or is even in sight. Anyway, at the moment the main problem of practically every producer is, not how to produce enough, but, on the contrary, how to dispose of his output, which implies at least relative plenty. And while there is, at the same time, poverty or, indeed, *any* unsatisfied want, it is true to say that there is "poverty in the midst of plenty." If Sir Josiah Stamp's paper was thought-provoking, we hope the foregoing observations will also receive careful attention.

* * * *

The Week's Traffics

Recent decreases, or comparatively small increases, in passenger train traffics of the four group railway companies, may be due to some extent to diversion of traffic to parcels post and also to the reduced parcel rates put in force by the companies to meet this new competition. Fears of a coal strike may also account in some degree for the recent advances in coal class receipts. Aggregate traffics of the four companies together for the 45 weeks amount to £130,703,000, an increase of £1,106,000, or 0·85 per cent. Passenger train traffics for the year to date have reached £59,477,000, an increase of £1,227,000, or 2·11 per cent. Merchandise traffics of the four companies to date show a net increase of £20,000, and the aggregate net decrease in coal class receipts has been reduced to £141,000.

	45th Week				Year to date	
	Pass., &c.	Goods, &c.	Coal, &c.	Total	Inc. or Dec.	
	£	£	£	£	£	%
L.M.S.R.	+ 2,000	+ 15,000	+ 7,000	+ 24,000	+ 656,000	+ 1·26
L.N.E.R.	+ 6,000	− 8,000	+ 14,000	+ 12,000	+ 85,000	+ 0·22
G.W.R.	− 2,000	+ 7,000	+ 13,000	+ 18,000	+ 181,000	+ 0·83
S.R.	+ 14,000	− 4,000	− 1,000	+ 9,000	+ 184,000	+ 1·05

Great Northern (Ireland) receipts to date show an increase of £49,000, and those of the Great Southern are £131,845 up.

* * * *

Six Months' Goods Traffics

Considerable variations in the merchandise traffics of standard gauge British railways in the 28 weeks ended July 13, 1935, can be shown from the analyses published

with the Ministry of Transport statistics for the month of June in the case of the whole 28 weeks, and from the figures for the 12 weeks ended March 23 published with the statistics for March. Higher class merchandise did badly in the first 12 weeks, being down by 255,090 tons and £153,329 compared with the corresponding period of 1934, but for the full 28 weeks the decrease in quantity was only 266,251 tons, and there was an increase of £200,805 in receipts. This seems to show that in the intermediate period of 16 weeks the decrease in quantity was only 11,161 tons, but there was an increase of £354,134 in receipts. For minerals and merchandise, classes 1-6, however, the second quarter of the year was less satisfactory than the first. In the 28 weeks the quantity was down 235,708 tons and the receipts were £85,892 lower. For the first 12 weeks, however, the tonnage was up 238,804, and the receipts were £17,318 down. It may be concluded, therefore, that in the intermediate 16 weeks the quantity went down by 474,512 tons and the receipts by £68,574. Though the tons of coal, coke and patent fuel for the 28 weeks were 1,172,244 less and the receipts £207,988 less, the tonnage would appear to have fallen during the second quarter by only 150,403 and the receipts to have risen by £100,815.

* * * *

Jamaica Government Railway

A satisfactory improvement in the results of the Jamaica Government Railway is shown in the report for the year ended March 31, 1935, which we have received from Mr. H. C. Powell, the director. In the previous year the banana industry, which provides the chief part of the goods traffic revenue, suffered severely from storms and floods, but in the year under review the tonnage of this commodity rose from 124,040 to 200,479 and receipts therefrom were £176,801, against £109,046 in the previous year. Canes, sugar, rum, and livestock also showed increases. Passenger receipts were, however, £579 down in spite of the increase in numbers. Expenditure was the lowest—with one exception—for the past ten years.

	1934-35	1933-34
Passengers	494,905	493,980
Goods, tons	300,865	207,358
Train-miles	434,253	389,343
Operating ratio, per cent.	89·52	117·82
	£	£
Coaching receipts	39,718	40,297
Goods traffic receipts	230,449	163,820
Gross receipts	293,767	224,987
Expenditure, including renewals	262,996	265,083
Working profit (+) or loss (−)	+ 30,771	− 40,096

Total debt charges on the railway during the year under review amounted to £108,637, leaving a balance of £77,866 to be met from general revenue.

* * * *

A Veteran Railway Steamer

The Southern Railway has sold to Dutch shipbreakers, at a price reported to be about £1,100, the steamer *Walmer*, which has been a good servant for over forty years. She was built in 1894 at Dumbarton, for the L.B.S.C.R. as the *Trouville*. This steamer and her sister the *Calvados* were twin-screw vessels, and although their tonnage was only 567 gross tons, they were good sea boats and maintained their steady 15 knots with triple-expansion engines. They were designed for the Newhaven-Caen intermediate service, which they did much to popularise until it demanded bigger ships. So in 1901 they were sold, the *Calvados* going to the General Steam Navigation Company and being renamed *Alouette*, while the *Trouville* was transferred to the S.E.C.R. fleet as the *Walmer*. For a short time during the war the latter was commissioned with the Expeditionary Force, but normally ran on such of the railway company's service as was allowed to survive, and escaped all enemy attention. In 1923 she was merged into the Southern Railway fleet, and while her sister, the *Alouette*, was scrapped on the Thames in 1924, the *Walmer* carried on usefully until now.

* * * *

Platelayer's Trolleys Attached to Motor Trolleys

The greater use of motor trolleys makes it advisable to draw attention to possible risks so involved. A non-fatal accident on March 1 last, which was inquired into by Mr. Moore, was not directly due to a motor trolley, but arose from the fact that an ordinary platelayer's trolley was attached in the rear of a motor trolley and trailer returning to the garage, two miles away. The platelayer's trolley was of the ordinary pattern, unsprung, and consisting of a light platform mounted on two pairs of wheels, and without any means of locking the axles in their bearings. The vehicles were coupled together in the usual manner by flat section iron bars, secured to the brackets on the headstocks by vertical bolts. Incidentally, the brackets on the platelayer's trolley were 4 in. higher than those of the other vehicles. All three vehicles were unladen, but the man who was hurt, who was of heavy build, was sitting in the left front corner of the platelayer's trolley, and it is supposed that when passing through some points, the man's weight on the front, and possibly the difference in the height of the coupling brackets, caused the rear end to lift sufficiently to release the rear axle from its bearings. Mr. Moore is of the opinion that platelayer's trolleys with axles free in the bearings are not suitable for use behind power-driven trolleys. The railway company concerned was recommended to take whatever action was necessary to put a stop to " this dangerous practice."

* * * *

Benefits Conferred by the Engineer

Travellers by rail nowadays demand the best that can be provided, a demand which is receiving a fair amount of attention but which is often difficult to accede to within the narrow limits of financial means. Wherever improvements can be made economically, however, few opportunities are lost and an example of this is to be seen in the enterprise of the Victorian Government Railways in the progressive acceleration of train services as improved locomotive power becomes available. The efficient locomotive is the first need, but having acquired the increased power a great deal of ancillary work is necessary to make the best use of it. None of this has been shirked in Victoria, and timetables have where necessary been completely rearranged in order to let the passenger and his goods have the full benefit of the latest improvements in engineering practice. The improvements already accomplished are regarded by the management of the Victorian Government Railways as merely the forerunners of further substantial improvements.

* * * *

High Speed in America

The fourth light high-speed diesel-electric train of the Chicago, Burlington and Quincy Railroad, prior to being placed in regular daily service between St. Louis and Burlington on October 28, made a trial run five days previously, during which it is said to have reached the speed of 122 m.p.h. The line on which this high speed was reached was practically straight and slightly downhill, the gradient varying between 1 in 1,000 and 1 in

330, and the highest speed, which is said to have been shown on the speedometer and independently checked by an observer in the train working with a stop watch on the mile posts, occurred on the eight-mile stretch between Edison and Oxford, at which latter place the train was stopped. From passing Edison to the stop at Oxford the 7·8 miles were covered in 4 min. 6 sec., an average speed of 114 m.p.h. The average for the whole start to stop test run from McCook to Oxford, 53·3 miles, was 82 m.p.h., the time taken being 39 min. 0 sec. The train consists of four articulated coaches mounted on five bogies and has a 600 h.p. diesel-electric power plant, but in the particular test mentioned above one of the cars was temporarily removed, reducing the formation to that of a three-car train weighing altogether about 110 tons (English).

* * * *

A Rebuilt "Royal Scot"

On page 835 of this issue there will be found brief particulars and an illustration of the first engine of the "Royal Scot" class L.M.S.R. to be fitted with a taper boiler. In rebuilding the engine the opportunity has been taken of introducing other features characteristic of Mr. Stanier's practice in locomotive design. Seeing that the engine is being placed in service at the present juncture the name applied to it, *British Legion*, has a particular significance. It will be noticed from the figures appearing in the article that the main difference between this engine and the others of the "Royal Scot" class is in the distribution of the heating surfaces in the boiler. The combined total, including the superheater, is less than before, this being accounted for by a reduction in the amount contributed by the tubes and superheater, whilst, on the other hand, there has been a slight increase in the amount of firebox heating surface. This is a matter in which figures do not always determine values, everything depending upon the effective distribution of the surfaces in contact with heat. The steam pressure carried by the boiler and the grate remain as before as also does the tractive effort. In regard to this latter no alteration was to be looked for as the cylinder dimensions and boiler pressure remain as originally adopted. A departure from the standard set up for all the engines having taper boilers of the L.M.S.R. is the fitting of a steam dome containing the regulator which, in other engines having this form of boiler, is usually located in the smokebox. The regulator is designed so that steam is taken from the highest point, the valve working on a horizontal face. The "Royal Scot" engines have always had numerous admirers and these, we think, will agree that in its new form the appearance of the engine is still further enhanced.

* * * *

The Shape of Wheel Tyres

In the course of his interesting paper read to the Institute of Transport last Monday on "The Application of the Diesel Engine to Traction on Passenger Lines and in Shunting Yard," Mr. C. E. Fairburn mentioned a simple cure for rough running that had been adopted on certain articulated diesel-electric trains in America. The last car of both the Flying Yankee and the Burlington Zephyr ran roughly at first. The standard coning of wheels on the Boston and Maine, the owners of the former, is 1 in 20, and on the Burlington line 1 in 40. On both trains the two trailing bogies had their wheels turned to be cylindrical, *i.e.*, without any coning, and this simple operation cured the trouble so completely that now the riding is said to be very good. On the Northern Railway of France experiments have been carried out of late with different wheel conings, and the latest diesel-electric high-speed trains on that line have wheels turned to a coning of 1 in 40 in place of the former 1 in 20 with, it is said, improved results in the smoothness of running. This question of the best shape for the tyres on rolling stock is an interesting one to which a final answer has not yet been given. Not long ago we heard from a Colonial railway that the running of its fast trains had been improved by altering the coning from 1 in 40, which had been standard, to 1 in 20.

* * * *

Heating and Ventilating Diesel Railcars

In Mr. Fairburn's paper on diesel traction to the Institute of Transport last Monday, reference was made to the difficulty of warming diesel railcars. If warmth were required only while the engine was running the problem would be simple, but in cold weather the vehicle should be pre-heated, and at times when the engine is idle warmth is required. A method popular on the Continent is the installation of a small coke or anthracite boiler of the slow-combustion type which requires firing only at comparatively long intervals, and, besides being economical in maintenance and installation, appears to be effective. The boiler, of course can be oil fired, and Mr. Fairburn mentioned one design which could be hung from the underframe. Another point referred to by Mr. Fairburn was that of ventilation. In some diesel railcars this has not been at all satisfactory and the question of air conditioning, although its installation adds to the weight and cost of the vehicle, is one of increasing importance. All the diesel-electric high-speed trains in the U.S.A. are fully air conditioned, and by this we mean that the air is not merely filtered and, in cold weather, warmed, but can be cooled in hot weather; and, most important of all, it has its humidity correctly regulated so that neither heating nor cooling has an unpleasant effect on the passenger.

* * * *

More Big Engines for South Africa

In another part of this issue we illustrate and describe one of the large 4-6-2 type express engines recently built by Henschel & Sohn of Kassel for the South African Railways. These add one more noteworthy class to the existing locomotive stock of the railways of the Union which have long been identified with an enterprising policy in connection with locomotive design. Built for the 3 ft. 6 in. gauge, the new engines would be regarded as large for the standard 4 ft. 8½ in. gauge, whilst in point of equipment and general layout they are modern in all respects. It is not, of course, suggested that this new class exemplifies the maximum of locomotive development reached on the South African Railways which can boast the possession of the most powerful 3 ft. 6 in. gauge articulated locomotive in the world, namely the 4-8-2 + 2-8-4 Beyer-Garratt built in 1929. This great four-cylinder machine, weighing in working order 214 tons, develops a tractive effort at 75 per cent. boiler pressure, of 78·650 lb. The new German-built express engines, however, must, we think, represent the absolute maximum possible for locomotives of the orthodox type on this gauge, having a boiler centre of 9 ft. 3 in., coupled wheel diameter 6 ft. and a grate area of 62 sq. ft. all of which figures are much in excess of anything hitherto undertaken on any narrow gauge railway. With two single-expansion 24 in. by 28½ in. cylinders, an adhesion weight of 60 odd tons and a very large boiler carrying a steam pressure of 210 lb. per sq. in. these new locomotives develop a rated tractive force of 35,572 lb. Steam distribution is effected by poppet valve mechanism, and the engine and tender in working order weigh 167 tons.

XUM

Railway Freight Rebates

UNDER the provisions of the Local Government Act, 1929, the Railway Rates Tribunal will begin on November 18 its sixth annual review of the operation of this scheme. This review will cover the operation of the Railway Freight Rebates Fund for the twelve months ended September 30, 1935, and will present considerable difficulty owing to the uncertainty connected with the re-valuation of the railways which has been carried out under the provisions of the Railways (Valuation for Rating) Act, 1930. Under the Local Government Act, the railways are relieved from the payment of three-fourths of their local rates on railway hereditaments upon condition that similar sums are contributed to the Railway Freight Rebates Fund, through which channel they are utilised to assist trade and industry by means of reductions from the freight rates applicable to selected industries—agriculture, coal, iron and steel. Thus, in effect, the railways are the conduit pipe by which relief is afforded industry and, in fact, during the last six years rebates totalling over £24,000,000 have been distributed. When the rebates for the year ended September 30, 1935, were settled in November, 1934, it was anticipated that they would absorb £3,899,000 and that there would be a surplus of £504,420 in the fund which could be carried forward to the year 1935-36. The susceptibility of the country's trade to international influences made it extremely difficult to forecast with accuracy the tonnage of the various classes of selected traffics likely to pass by railway during the ensuing twelve months, and, in fact, the amounts paid out in rebates during the period amounted to £3,799,477, of which £2,612,307 was in respect of coal class traffic, (£90,000 less than estimated), £791,837 on agricultural traffics (£7,000 less than estimated) and £395,333 on other industrial traffics (about £3,000 less than estimated). The surplus remaining in the fund at September 30, 1935, proved to be £635,581, which is £131,161 more than was anticipated. While these figures appear to indicate that the existing scale of rebates could be continued during the ensuing twelve months, the position is decidedly complicated by the recent developments in connection with the assessments of the railways for rating purposes.

The companies have repeatedly expressed the view to the tribunal that, since the passing of the Railways (Valuation for Rating) Act, 1930, their assessments were excessive and that, when the new valuations become operative, their total rate relief would not exceed one-half of the rate relief estimated for the purpose of calculating rebates and, indeed, might well be less than that figure. Support is given to this contention by the case of the Southern Railway where, while the Railway Assessment Authority fixed the net annual value of the undertaking as a whole at £2,180,000 for the five years from April 1, 1930, the Railway and Canal Commission, on appeal, determined the net annual value to be £1,077,131, a figure which is less by £762,869 than the existing valuation of the Southern Railway Company's undertaking upon which the provisional payments for rate relief have in the past been made by that company into the Railway Freight Rebates Fund. The Assessment Authority, in conjunction with certain local authorities, has appealed to the House of Lords against the decision of the commission, but the consolidated appeals are not likely to be heard until December.

The House of Lords decision will be of great importance as, if the reduced valuation is maintained and the same principles are applied to the other companies, the reduced valuations will apply as from April 1, 1931, and mean that the railway companies have over paid in local rates something like £10,000,000 during the last five years. In these circumstances, the companies urge that their estimated rate relief for the ensuing twelve months should not be calculated as hitherto on the basis of the existing assessments, but that full regard should be had to the decision of the Railway and Canal Commission and to the principles enunciated thereby. Moreover, full consideration should be given to the probability that large repayments may be due to the companies in respect of the difference between their actual rate relief since April, 1931, and the estimated rate relief upon which the companies have been making payments into the fund. It is unfortunate that the decision of the House of Lords will not be known until after the tribunal has concluded its review, as the decision will be of vital importance to railways, traders, and local authorities, in view of its effect upon the future of the fund. The extent to which the tribunal feels able to take into consideration these prospective liabilities, however, remains to be seen.

Bengal-Nagpur Railway

THE Bengal-Nagpur system includes two principal main lines on the 5 ft. 6 in. gauge, one running west from Howrah (Calcutta) to Nagpur, where a junction is made with the Great Indian Peninsula Railway to Bombay, and the other southwards from Khargpur (72 miles west of Howrah) by the east coast to Waltair, where connection is made with the Madras & Southern Mahratta system, and to Vizagapatam. Raipur on the Nagpur line is connected with Vizianagram on the east coast line by a broad gauge chord. Between Howrah and Khargpur the line is double-tracked. As the recently-issued report shows, gross earnings for the year ended March 31, 1935, increased by Rs. 56,18,096, or 7·53 per cent. In working expenses there was an advance of Rs. 39,23,651, or 7·48 per cent., so that net earnings improved by Rs. 16,94,445. Net earnings, however, failed by Rs. 35,40,881 to meet interest charges, and there are, consequently, no surplus profits to divide between the Government and the company. For the two previous years the deficits were respectively Rs. 52,66,114 and Rs. 95,49,093. There have been no surplus profits since 1927-28. Stockholders receive 4 per cent. for the year under review, the same as for the three previous years, of which 3½ per cent. comes from guaranteed interest and 10s. from reserve. After providing for this dividend the balance of the reserve will be approximately £43,000. Some operating figures are compared in the accompanying table:—

	1934–35	1933–34
Mean mileage worked	3,268	3,269
Train-miles	13,820,469	12,698,214
Passengers	18,904,435	18,342,654
Goods, tons	15,479,307	13,975,171
Operating ratio, per cent.	70·29	70·33
	Rs.	Rs.
Passenger receipts	1,58,16,397	1,52,98,698
Goods earnings	5,95,43,147	5,47,35,825
Gross earnings	8,01,78,757	7,45,60,661
Expenses	5,63,60,551	5,24,36,900
Net earnings	2,38,18,206	2,21,23,761

Passenger numbers increased 3·06 per cent. and receipts 3·38 per cent., all classes, but mainly the third, contributing to the advance in earnings. In general merchandise there was an increase of 902,921 tons and Rs. 32,10,765, and in fuel an increase of 339,456 tons and Rs. 8,32,073. In the report is an interesting analysis of the principal traffic items. Reduced rates for manufactured cotton from Bombay and B.B. & C.I. stations to Calcutta in competition with the sea route, combined with special arrange-

ments for quick transit, have effected a satisfactory diversion to the rail route. Road competition in the carriage of lac has been checked by the recently introduced licensing regulations and by quick transit rail services. Low minimum rates from the Central Provinces to Vizagapatam Port and the shipping facilities there contributed to the increase of Rs. 17,48,648 from manganese ore. The decrease under oil seeds is partly accounted for by the fact that Argentina, consequent on a bumper crop, undercut India in price for linseed.

In working expenses there were increases of 8·09 per cent. under maintenance of structural works, due to heavier repairs to bridges, to more expenditure on ordinary renewals of sleepers and rails and to replacement of Douglas Fir sleepers by metal sleepers on certain sections. The cost of maintenance and supply of locomotive power rose by 8·54 per cent., and the increase of 32·33 per cent. in maintenance of carriage and wagon stock was mainly due to the purchase of 500 open goods wagons under the head replacements and renewals. Capital expenditure during the year amounted to £194,588, which included doubling the Rupnarain bridge.

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The First Route to Bournemouth

COMPARATIVELY little general interest has been taken in the closing of the Christchurch-Ringwood branch of the Southern Railway on the introduction of the winter timetable. This railway, however, provided at the time of its opening the nearest railway approach to Bournemouth, and when the railway actually reached that popular Hampshire resort it was by means of an extension of this line. At the time that the L.S.W.R. system was being extended into Dorset by means of the Southampton & Dorchester Railway, Bournemouth was virtually non-existent and, therefore, when the great opposition offered to the scheme by the Woods and Forests Commissioners resulted in a prohibition to run through any wooded portion of the New Forest, it was natural that an inland course through Ringwood should be adopted. The Southampton-Dorchester line was opened in 1847, and from Ringwood its course was via Wimborne, Poole Junction (now Broadstone), Hamworthy, and Wareham. This line was worked from its opening by the L.S.W.R., which acquired it outright in 1848 and doubled the tracks in 1863. Bournemouth was then but a village—its population in 1851 was only 695—and the usual means of approach from London was by horse coach from Christchurch Road (now Holmsley) station, some 14 miles distant. Hamworthy, to the west of Poole, was somewhat nearer and also served Bournemouth.

With the growth of the town better access was sought and on August 8, 1859, the Ringwood, Christchurch & Bournemouth Railway Company was incorporated to build a 7¾-mile branch from the L.S.W.R. at Ringwood to Christchurch. This was opened on November 13, 1862, by which time powers were being sought for its extension some 3½ miles into Bournemouth. An Act of 1863 sanctioned this, and on March 14, 1870, Bournemouth became linked with the railway system when this extension was opened to a station called Bournemouth East, which stood about ¼ mile on the London side of the present Bournemouth Central, where the goods yard is now situated. The L.S.W.R. obtained powers in 1866 to build a line from Broadstone to Poole, and this was opened in 1872, and extended (by a separate company, but worked by the L.S.W.R.) to the western side of Bournemouth from Poole two years later. Meanwhile the Ringwood, Christchurch & Bournemouth Railway was amalgamated with the L.S.W.R. as from January 1, 1874. Despite being a single line with severe gradients and curves, and a speed limit of 25 m.p.h., it provided the main route to London, 116 miles from Bournemouth to Waterloo. The line traverses a wonderful area of (still) wild and boggy moorland between Christchurch and Hurn, and a delightful district of undulating pinewood parkland between Hurn and Ringwood. The only public intermediate station was at Hurn, but a private station at Avon Lodge (between Hurn and Ringwood, 1¾ miles from the latter point) was built to serve the Earl of Egmont's estate. The small station at Hurn is far from any habitation, except the railwayman's cottage. It has two platforms, but the eastern one has been dismantled for many years and the track serving it taken up.

In 1883 the L.S.W.R. secured comprehensive powers in order to improve the lines around Bournemouth. The scheme included doubling the existing lines on the Christchurch-Bournemouth East and Poole-Bournemouth West, sections; linking the two Bournemouth stations; and building a direct line between Brockenhurst and Christchurch via Sway. The building of the direct Sway line caused a considerable amount of trouble owing to the nature of the ground (crumbling blue clay) between Sway and New Milton. Between these points the line runs over the Sway embankment, about ½ mile long and 60 ft. above the valley. The direct line via Sway and the connecting link to Bournemouth west were opened on March 5, 1888, thus shortening the journey from London by about 8 miles and enabling the 108 miles to be covered in 2 hr. 50 min. at first, and 2 hr. 23 min. when the line was consolidated. The opening on June 1, 1893, of the connection from Bournemouth Central to Branksome enabled trains from Weymouth to London to proceed direct, without reversing in the West station.

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Palestine Railways

THE 999 route-kilometres of line operated by the Palestine Railways Administration traverse three States—Egypt, Palestine, and Trans-Jordan—and serve country of widely differing character. They also vary in gauge and ownership. Of the 532 km. of standard-gauge line, 329 are in Palestine, are known as the Palestine Railway, and are the property of the Palestine Government. The remaining 203 km. of standard-gauge line constitute the El Kantara (Suez Canal)-Rafa Railway in the Egyptian territory of Sinai and are the property of the British Government. On the 467 km. of line which make up the two sections of the Hedjaz Railway, situate respectively in Palestine and in Trans-Jordan Mandated Territory, the unusual gauge of 3 ft. 5⅛ in. (105 cm.) prevails. These two sections are connected by a link in Syria belonging to and operated by the Syrian authorities. Separate accounts are kept for the three groups of railways, namely, Palestine, El Kantara-Rafa, and Hedjaz.

From the Crown Agents for the Colonies on behalf of Mr. C. R. Webb, the General Manager, we have now received the report* for the financial year ended March 31, 1935. On the Palestine Railway the year under review was the busiest in its short history, apart—as regards tonnage—from the years when large quantities of stone were being carried under special arrangements for a short distance of 16 km. for the construction of the harbour at Haifa. Total receipts increased by 32·9 per cent. over the previous year, but operating expenses advanced by 17·15 per cent, on account principally of the heavier traffic but also of washaways during the winter. Passenger traffic

* Obtainable from the Crown Agents for the Colonies, 4, Millbank, London, S.W.1. Price, 150 mils (3s.)

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receipts increased by £P.44,639, or 29·6 per cent., and goods traffic receipts by £P.88,415, or 36·6 per cent. Revenue exceeded ordinary working expenditure by £P.284,787, but after taking into account the expenditure of £P.76,953 on extraordinary works, £P.56,700 on renewals, and £P.157,140 in respect of debt charges and sinking fund, there was a deficit of £P.6,006 only, as compared with £P.15,660 in the previous year. In the case of the Hedjaz Railway there was an increase of £P.3,123 in passenger traffic, entirely on the Palestine section, but there was a decrease of £P.9,316 in goods revenue largely caused by the falling-off in the Iraq Petroleum Company's traffic on completion of the pipe line and by the interruption of traffic on account of flood damage. The increase in working expenditure was mainly due to outlay on making up accumulated arrears of maintenance on locomotives and rolling stock. Working results of the three main sections are compared in the accompanying table:—

	1934–35 £P.	1933–34 £P.	Difference £P.
Palestine Railway:			
Gross receipts	573,614	431,706	+ 141,908
Working expenditure ..	288,827	246,531	+ 42,296
Balance of revenue ..	284,787	185,175	+ 99,612
El Kantara–Rafa Railway:			
Gross receipts	118,495	106,808	+ 11,687
Working expenditure ..	91,233	89,893	+ 1,340
Balance of revenue ..	27,262	16,915	+ 10,347
Hedjaz Railway:			
Gross receipts	90,545	98,445	— 7,900
Working expenditure ..	101,020	90,329	+ 10,691
Balance of revenue ..	*Dr.* 10,475	8,116	— 18,591

The respective operating ratio percentages in 1934-35 of the Palestine. El Kantara-Rafa, and Hedjaz Railways were 50·3, 77, and 111·6, as compared with 57·1, 84·2, and 91·8 in the previous year. It is pointed out by the General Manager that the low operating ratio of 50·3 per cent. on the Palestine Railway is a standard which, in the circumstances of the line can hardly be maintained. The service of goods trains was maintained with some difficulty, especially at the peak of the heavy traffic. Timekeeping continued to be unsatisfactory. The principal direct cause of the trouble was the small number and poor condition of locomotives available for traffic, due primarily to bad water, and for reasons of economy, insufficient maintenance. The arrival in December of twelve new boilers, which enabled this number of laid-by engines to be reconditioned and brought into use, improved the situation. During the year a contract was made for the supply of water with a company which had sunk wells in the Acre Bay, and this is already having some effect on the locomotive situation. On the greater part of the Jerusalem-Jaffa line wooden sleepers have now been replaced by steel sleepers. During the year the survey of the route and station sites for the proposed deviation of the main line of the Palestine Railway to run through Jaffa and Tel Aviv was carried out efficiently and at small cost. The results of this survey were used by Sir Felix Pole, who went to Palestine in January to advise the Government on this scheme. Mr. C. M. Jenkin-Jones, who arrived in Palestine on January 18, and left again on March 26, made a most comprehensive study of the traffic position. During his visit he made an interim report to Government with regard to additional equipment immediately required, and his recommendations in this interim report were at once accepted and the necessary orders were placed. Representatives of Messrs. Price, Waterhouse & Company also carried out an investigation of the financial accounts and stores organisation. The accounts system is unusually complicated by the necessity for keeping three separate sets of accounts for the three railways. The reports of those experts are now under consideration.

LETTERS TO THE EDITOR

(*The Editor is not responsible for the opinions of correspondents*)

Railways and Land Values

99, Clifton Road, S.E.25.
November 10

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—The railways have received so small a share of the wealth they have helped to create in the past that it is natural to enquire into the possibility of securing a better return from developments that seem likely during the next few years.

It is not merely that schemes of electrification could be financed in large measure out of the ensuing increases in land values, provided the land so affected were in the railway companies' possession, but also, the new residential centres could almost certainly be developed with greater economic efficiency (from the point of view of both tenant and proprietor) under railway ownership than when rent and season-ticket rates are subject to separate control.

If the railway companies are not in a position to finance operations on such a scale, might it not be worth while to have the whole matter investigated by a joint committee containing representatives of the steel, electrical, and other industries concerned?

K. H. JOHNSTON

[For example, if the former Charing Cross, Euston & Hampstead Railway had been able compulsorily to purchase all the land in the Golders Green district at the then values, and dispose of it 20 years later, the capital appreciation would have enabled many other much needed underground railways to be built. As it is, other people than the railway have benefited most from this extension.—ED. *R.G.*]

The Station Block in Italy

82, York Road, N.1.
November 7

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—With reference to your issue of November 1, wherein you state that "signalling in Italy bears a resemblance to that seen in Great Britain, from which indeed the earliest Italian installations were derived," a striking example in proof of this statement is found in that semaphore arrangement which obtains in Italy of a home signal arm and a distant signal arm mounted on the same spindle, the former in front of the latter, there being one lamp by means of which three aspects are given for night indication.

Such an arrangement was patented by Mr. S. T. Dutton in the year 1875 (No. 936) of which the following is an extract from the specification:—

> When the home signal at a station is controlled as a distant signal from the next station the usual single arm is replaced by two arms one in front of the other. The home arm works independently but the distant arm cannot be lowered until the home arm falls, while it is put to danger by rise of that arm. A white light is shown when both arms fall and a red light when both are raised. When the home is lowered alone a green letter H, a red letter D or other design is shown. The ordinary lamp may be used with spectacles arranged to give a red, green, or white light for the three indications.

With a mere change in the colours employed for night indication this invention of 60 years ago might be a description of one of Italy's present day semaphore signals.

RALPH S. GRIFFITHS

PUBLICATIONS RECEIVED

The Traveller's Pocket Reference, 1935. Lausanne: Anglo-Continental and International Publishing Offices Limited, 3, Boulevard de Grancy (also at Warwick Chambers, Corporation Street, Birmingham). 6½ in. × 4½ in. 264 pp. Obtainable through Messageries Hachette, 3, La Belle Sauvage, Ludgate Hill, London. Price 1s.—Issued as a supplement to "XXth Century Health and Pleasure Resorts," this pocket handbook is designed as a portable aid to those in search of the pleasures outlined by the larger work. It is in two parts, the first listing the principal Continental and certain overseas countries alphabetically, with particulars of resorts and means of access thereto, and the second consisting of short articles on travel and holiday subjects. Rail transport is generously treated. There are many useful diagrammatic maps of the principal railway routes in the countries dealt with, notes on times of transit, and references to the connections afforded by international expresses. A section of "don'ts" for travellers includes several applicable to passengers by train, including an exhortation not to pull the communication cord in order to admire the view (an authentic case of this having happened above the Lake of Geneva is recorded) and the advice not to rebuff the advances of sociable fellow travellers. An article on travel by railcar describes its novelties and attractions, and suggests that these vehicles would make an attractive type of touring camping coach if fitted with berths and a kitchenette.

Canada Today and Tomorrow. By Basil Fuller. London: Stanley Paul & Co. Ltd., Paternoster House, E.C.4. 9½ in. × 6¼ in. × 1½ in. 288 pp. Illustrated. Price 15s. 0d. net.—Although there is a chapter specifically entitled "Travel and Communications" in this book, the railway seems to pervade it everywhere, just as it pervades Canada itself. To quote the author: "the Canadian Pacific must enter into practically any extensive discussion of Canada, for it looms largely in the life of the country . . . . The natural desire to be in close touch with one or other of the great arteries of communication is an outstanding factor in the life of all Canadian country districts." And so it came about that when Mr. Fuller required information on certain Esquimaux customs, he was not advised to consult an encyclopedia or library, but to "ring through to the good old C.P.R." The Canadian National Railways command a similar esteem, but have not quite won the affection accorded the older enterprise.

The author has the gift of conversation, and of imparting what he gleans from his talks with men of all conditions to his readers. Whether discussing the town or country dweller, education and culture, mineral wealth, or the emigration problem, he speaks as a man who has taken the trouble to find out what Canada feels and thinks. Too many writers who set out with Mr. Fuller's excellent intention of promoting international understanding ruin their case by stating only what the other man ought to feel and think in order to coincide with their own home-hatched notions.

Canadian railway history can be read in other sources than such a book as this, so Mr. Fuller has done well to confine it to a brief sketch of the present situation and its causes, and to devote equal space to his encounters with Canadians on the train. It is a surprising fact that the people of the country, although possessing every inducement to travel in the shape of a network of communications, in which they confess to a deep pride and interest, prefer to take their holidays near home and mainly eschew long journeys except when unavoidable. Mr. Fuller includes in this chapter a summary of the findings of the Royal Commission on Canadian railways, and topical references to road, air, and water competition. It is a pity that full reference to these matters is not given in the index. Views of railway scenery, trains and stations figure prominently in the illustrations to this and other chapters of the book.

Canada does not appear to suffer from the attacks of self-depreciation which occasionally assail the Mother Country, and, indeed, she looks to London with a confidence which may embarrass those who prefer from conviction or expediency to renounce the responsibilities of empire. The least we can do for her is to study her achievement and aspirations in a forthright and understanding book such as this of Mr. Fuller's.

Hundert Jahre Deutsche Eisenbahnen: Die Jubiläumsausstellung in Nürnberg. (A Century of German Railways: The Commemorative Exhibition at Nuremberg.) Special Issue of the *Organ für die Fortschritte des Eisenbahnwesens*. No. 15/16, August 1, 1935. Berlin: Julius Springer. 12 in. × 9¼ in. 70th. Numerous illustrations and folding plates.—This is an enlarged issue of the official technical journal of the Central European Railway Association, and is an exceedingly important and useful addition to the numerous publications which the German railway centenary has called forth. The *Organ*, now in its 90th year of publication, is nearly as old as the German railways themselves and it has contributed in no small degree to that combination of theoretical knowledge and practical experience which has made German railway engineering justly admired in other lands. On many occasion the *Organ* has issued special numbers, and the present one is in no way inferior to its predecessors in contents or the manner of their presentation. The articles in it are written by engineers specially experienced in their respective departments, and are all of a technical nature. The Editor himself, Dr. Uebelacker, deals with the Nuremberg exhibition, and further contributions cover steam locomotives, diesel locomotives, passenger carriages, railcars (both express and ordinary, diesel and electric) goods wagons, brakes, permanent way, signals, telegraphs and telephones, road wagons for the transport of railway trucks, and the special 75 tonnes crane wagon of the German State Railway. An attentive reading of one article alone is enough to impress the reader with the high level of railway engineering in Germany and the constant attention devoted by the State Railway management to every possibility of improvement, scientific and economic. The experimental work done in many branches of the subject, as for example automatic train control, is worthy of all praise. Although electrification has made great progress in Germany, the steam locomotive is the object of constant efforts at improvement and in this, as in every other activity, the Reichsbahn is efficiently aided by private industry. The present publication deals with the situation today, at the end of 100 years, and we see with pleasure that on December 7, the actual commemoration day, a complementary number is to appear which will deal with various phases of technical progress since the Nuremberg-Fürth Railway was opened.

Air Heaters.—K.-B. air heaters, the product of James Keith & Blackman Co. Ltd., are well known for the flexibility of application permitted by their unit assembly. The range of equipment for the 1935-36 season, a catalogue of which has just been published, gives the choice of 100 unit sizes in each type of heater. Steam, at any pressure to give a temperature up to 500° F., or hot water, may be used as the heating medium. The heaters are either steel or copper gilled, and the sections are mounted in channel framing with the necessary connections for linking up with the duct system.

Blast Furnace and Bessemer Plant.—A well-produced and strikingly illustrated booklet has been published by the United Steel Companies Limited, Sheffield, describing the blast furnace and Acid Bessemer plant of the Workington Iron & Steel Company. The book is divided into sections dealing with raw materials, the blast furnaces, Acid Bessemer steel and the rolling mills, and the products of the company in general. The company also has a steel sleeper plant at which many types have been produced, including special designs for use on British Railways. Rails and fishplates are among the chief products made from Acid Bessemer steel. The equipment and activities of the works are described with an effective conciseness.

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THE SCRAP HEAP

"Fancy putting a railway station three miles from the village!"

"Well, sir, we had to have it by the railway."—*From "The Evening News."*

* * *

WHEN RAILWAYS GAVE CHRISTMAS BOXES

In a copy of the "Classification of Birmingham, South Staffordshire, and East Worcestershire Iron Districts," dated January 1, 1867, and bearing the imprint, "John Steen, printer by steam power, Queen Square, Wolverhampton," there is a curious memorandum on page 40 (the last), which reads: "The following advertisements appeared in the newspapers undernoted between November 26, 1866, and December 8, 1866:—

Birmingham Daily Post (6 times)
Birmingham Daily Gazette (6 times)
Birmingham Journal (2 times)
Wolverhampton Chronicle (2 times)
Midland Counties Express (2 times)

The railway and canal companies hereby give notice that they will henceforth cease to distribute Christmas Boxes and New Year's Gifts in Birmingham, Wolverhampton, the South Staffordshire, and East Worcestershire Districts."

It would be interesting to know what gave rise to a practice that had evidently been observed previously, and in what form and to whom such gratuities were "distributed."

* * *

AN UNUSUAL PIECE OF PERMANENT WAY WORK

In our issue of April 12, we reproduced two photographs showing an unusual piece of permanent way work, consisting of a combined elbow and crossing fitting in a goods yard. It is situated in the old G.N.R. yard at Adolphus Street, Bradford, and there are at least six similar crossings in use in the Leeds District of the L.N.E.R. The normal angle of the obtuse crossing is 1 in 7, while the introduction of the third rail increases the total spread to 1 in 4.

We reproduce the photographs again and, in addition, a diagram of the layout which shows these angles of crossing better. The first of the photographs was taken looking in the direction of the arrow A in the present diagram, and the second in the direction B. An important point which cannot be shown clearly to so small a scale is the elbow bend in the combined back rail and crossing wing marked C. In detail, this is made up of two equal bends joined by a straight length of rail about 18-inches long. This has the effect of reducing the rail table for wheels travelling along one of the crossover roads of the diamond, with the result that the bearing stresses are increased, and therefore the severity of localised wear becomes greater. Maintenance cost are thus affected.

There is no reason why derailments should be feared for any spread of obtuse angle up to 1 in 7, but for flatter angles the crossing vee points would have to be set so far back from the theoretical point of crossing that the gaps would be too great for the wheels to span safely.

The whole layout is, of course, one to suit particular conditions as cheaply as possible. In these cases, the layout would enable a flatter radius to be used for the slip road in cramped situations, but in the majority of instances it is usually practicable to achieve almost the same result by allowing the outer rail of the slip road to encroach slightly inside the diamond and so allow the use of standard design crossings and elbow points.

* * *

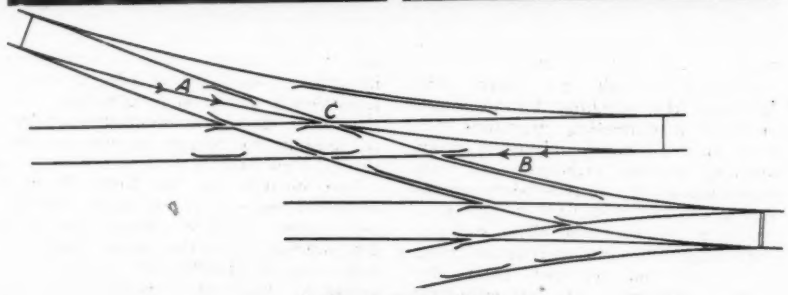
The peculiarity of the Southern Railway and G.W.R. lines at Exeter (St. Davids) and Plymouth (North Road) stations that London-bound trains pass through the same stations in opposite directions for the same destination, has several parallels in the U.S.A., according to our contemporary the *Railway Age*. Passenger trains from the Twin Cities to Duluth meet each other in opposite directions, one going due east, the other due west, between St. Paul and Minneapolis. This is brought about by reason of the fact that the Northern Pacific trains start at Minneapolis and run through St. Paul to Duluth, while the Great Northern trains start in St. Paul and run through Minneapolis to Duluth. Moreover, tickets of either road are good on the other, since a pooling arrangement is in effect on these runs. The Northern Pacific is involved in a similar case with the Chicago, Milwaukee, St. Paul & Pacific in Montana, where for several miles the railroads are parallel and trains from the east to the Pacific northwest run north on one road and south on the other. Another instance of this is in Maryland between Baltimore and Washington. Baltimore & Ohio trains from the West to the East operate northbound between these two cities, while corresponding Pennsylvania trains operate southbound, and vice versa. One may go from Washington to Baltimore on a B. & O. train from Chicago or on a Pennsylvania train bound for Chicago. The Panama Railroad, however, is unique in the matter on unusual directions. That line actually runs east from the Atlantic Ocean to the Pacific and vice versa.

Polling every day at your nearest
GAS SHOWROOMS

HOW TO VOTE

Mr. CHILLSPOT - - |
Mrs. Cold CORNER |
Mr. THERM - - - | X

A "gas" election



A three-way crossing

OVERSEAS RAILWAY AFFAIRS

(From our special correspondents)

NEW ZEALAND

Bridge Rebuilding

A steady programme of bridge rebuilding is now being worked to in the South Island, and at present the railway workshops are engaged in fabricating 1,276 tons of steel plate girders in this connection. Of these, 253 tons are for the new Ashburton River bridge (32 spans each of 35 ft.), and all of the girders are now practically completed and are gradually being delivered on the job. The Rangitata bridge (32 spans of 60 ft. each) will need 650 tons of girders, many of which are also completed and will be delivered as the work progresses.

In addition there are 473 tons of girders on order, for which the steel has not yet arrived from England, but their fabrication will follow the completion of the other works. The rivets for these various regirdering works—of which the Rangitata bridge alone requires more than 100,000—are now all manufactured in the railway workshops. Formerly the practice was to purchase them overseas. The girders were designed by the Chief Engineer's staff in Wellington and the work of erection will be done by the District Engineer concerned.

Railway Tarpaulins: A New Process of Wax Waterproofing

The open high-sided wagon is of such general utility for the types of railway traffic most developed in New Zealand that tarpaulins are an important factor in the carriage of freight. Some 26,000 are scattered all over the railway system and practically every one goes through the workshops once a year for repair and re-dressing.

With the recent introduction of new plant, a revolutionary change in the manufacture of tarpaulin covers has been effected, as a result of which better protection will be given to goods in open wagons and a reduction in costs to the Railway Department will result. The essence of the new process is the saturation of the canvas with a wax composition, which has many advantages over the older method of waterproofing: at the same time the weight of the canvas used has been increased from 18 oz. to 20 oz.

Twelve feet high and twenty-four feet long, the machine for the new process of wax-dressing tarpaulins (for which the canvas is obtained from England) consists principally of two compartments, the canvas being waterproofed with composition in the first and dried in the second. The material is introduced at one end direct from the steamer as received from the makers. First it is marked with the standard N.Z.R. initials and then passes at a speed of 18 ft. a minute round a series of rollers immersed in the hot, melted wax composition. Next it passes through press rollers and then six times up and down a tall heated chamber, to which are attached steam coils and ventilating fans, where it is thoroughly dried. As the canvas issues from the machine it is rewound ready for the cutting tables.

UNITED STATES

New York, New Haven Finances

Still another major railroad, the New York, New Haven & Hartford, has succumbed to the dearth of traffic and, having at last exhausted its capacity to borrow to meet tax and interest payments, has applied to the courts for the appointment of a trustee in bankruptcy. The New Haven's fall, with its 2,000 miles of line, raises the total of American railways in the hands of the courts to almost 68,000 miles—or more than 26 per cent. of the total railway mileage of the country.

The direct cause of the company's application for court intervention was the refusal of the Interstate Commerce Commission to approve a further loan of £1,000,000 to the company by the Reconstruction Finance Corporation, the Federal Government's emergency lending agency. The funds were needed by the company to pay taxes falling due between October and December. Its borrowings from the R.F.C. already totalled £1,539,000; and, in addition, it owes another Government agency, the Public Works Administration, £1,420,000, and has further short-term loans of £685,000 from the Railroad Credit Corporation and £3,255,000 from the banks. In negotiating these previous loans the company exhausted its treasury holdings of securities for deposit as collateral, and in asking for a further loan of £1,000,000 from the R.F.C. it was able to offer as security only those bonds and shares already pledged.

Inevitable Reorganisation

In view of the fact that the company, according to its own estimates, will suffer a deficit of £1,000,000 after meeting taxes and all charges in 1935, and even foresees a small deficit in 1936 in spite of its confidence in a traffic revival which seemed " optimistic " to the I.C.C., there was no alternative but to submit to re-organisation of the capital structure.

The decline in the New Haven's revenues has been catastrophic. In the ten years 1921-30 they averaged £27,000,000, and this year they are estimated at £14,000,000—which latter would be, however, if realised, an improvement of £500,000 over 1933 and £150,000 over 1934. Despite heroic efforts to reduce operating expenses, and deferring maintenance work, the management could not hope indefinitely to carry on against such odds, as long as upwards of £3,000,000 of net profits are needed after payment of all expenses and taxes to satisfy interest requirements.

The equity in the property remaining to the common shareholders in a financial re-organisation on the basis of present earnings is a matter which would require a microscope to explore. These shares are currently selling at 3. The Pennsylvania Railroad owns 319,925 of them.

Passenger Fares Controversy

The Interstate Commerce Commission has *sub judice* an interesting case involving standard passenger fares. The Western and Southern railways voluntarily reduced their fares to 1d. a mile, or lower, have abolished the supplementary charge of 50 per cent. of the rate for Pullman accommodation, and have experienced a lively revival in traffic, with some improvement in revenue, as a result. The Eastern railways, however, have clung tenaciously to the standard rate of 1·8d. a mile and have made no concession as regards the Pullman surcharge. The Eastern lines, it is true, have excursion and week-end rates which are lower than the 1·8d. standard; but, on the whole, the mid-week business traveller in the area north of the Ohio river and from the Mississippi eastward to the Atlantic seaboard is still paying the peak post-war rate, which was established when automobile operating costs were easily double what they are now.

Eastern Lines' High Fares

The out-of-pocket costs of operating an automobile, even with only one passenger, are apparently well below the 1·8d. standard fare of the Eastern railways. The consequence has been that the public has deserted the railways with great enthusiasm. Passenger revenues, exclusive of season ticket earnings, from 1923 to 1933 declined 73 per cent.; from more than £215,000,000 to less than £56,000,000.

The attitude of the Eastern railways is dominated by the three great systems—the New York Central, the Pennsylvania, and the New Haven—which do the bulk of the passenger business. The responsible officers of these companies do not believe that a reduction in fares would bring a sufficient increase in traffic to compensate for the reduced earnings per passenger-mile. The examiner who prepared the case for the Interstate Commerce Commission based his argument for lower rates (1d. per mile in coaches and 1½d. in Pullman cars) almost entirely on the assumption that the lower rates would yield greater revenues.

The question raised is a fundamental one, namely, shall the commission substitute its judgment in a matter of business policy—what rate will bring the highest return?—for that of re-

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sponsible railroad officers? There are many persons who believe that the commission's examiner who recommended lower rates is right, and that the railway officers insisting on the *status quo* are hopelessly blind to the realities of modern competitive conditions; but who also believe that the imposition by the Interstate Commerce Commission of its judgment in such a matter would constitute a blow to railroad managerial morale for which no prospective increase in passenger traffic could very well compensate.

The question at issue is one of fundamental importance to the future of the relationship between railway managements and the regulatory authorities, quite apart from the merits of the controversy itself. The managements of the Eastern railroads have not, apparently, grasped the principle of "casting their bread upon the waters" as recently enunciated by Mr. Ashton Davies, or of accepting lower passenger revenues for a time as the price they must pay to reverse the trend of those revenues. Or perhaps their reluctance springs rather from the fact that, in these times, they have so little "bread" available for casting—or for any other purpose.

Car Loadings Increase

Meanwhile the recovery in freight traffic proceeds apace. Loadings in the week ended October 19 were 732,947 cars. In the preceding week the total was 734,274. Not since the autumn of 1931 has business been so brisk. This is the time of year when the peak in freight traffic is usually reached, and seasonal recession will doubtless now occur. But, if the recession is no more than seasonal between now and the end of the year, some revival in purchases of railway equipment and materials will probably follow. And that is the major need of the heavy industries, to follow the current increase in building, to provide a volume of business which will bring railway traffic back to the point of genuine recovery.

SWITZERLAND

Federal Railways' 1936 Programme

The 1936 budget of the Federal Railways, particulars of which were recently published, shows a deficit of fr. 69·7 million. Works to be undertaken during that year at a total expenditure of fr. 29·7 million include: (1) the first stage of the deviation between Berne station and the Wilerfeld yards; (2) the construction of a connecting line between Cornavin and Eaux-Vives stations at Geneva; (3) further steps in the reconstruction and enlargement of Geneva and Neuchâtel stations; (4) the doubling of the line between Emmenbrücke and Sentimatt junction, Lucerne; and (5) the electrification of the Giubiasco-Locarno and Gossau-Sulgen single-line sections. A sum of fr. 9·6 million is to be expended on new rolling-stock, including four light high-speed electric railcars, some electric and petrol shunting engines, thirty coaches, twelve vans and a hundred goods wagons are to be ordered, while thirty steam engines and seventy wagons will be scrapped. The equipment of goods wagons with the Kunze-Knorr air brake is to be continued, and automatic train control extended.

Rail Excursions

The station staffs of the Swiss Federal Railways, and particularly the inquiry offices in the larger stations, are showing considerable activity in organising special excursions by rail, in competition with the numerous road transport concerns. During 1934, as many as 1,947 such excursions were arranged, carrying a total of 143,251 passengers. These figures, of course, do not include the traffic secured for ordinary excursion trains.

An excursion innovation is the use of the new light streamlined cars for special trips on Saturdays and Sundays, when they are not in regular service and their place is taken by light trains. Since the introduction of the two electric cars last May, a number of trips has been arranged from all parts of the country, invariably including some line on which the maximum speed of 125 km.p.h. may be attained. These runs have proved very popular, and further developments on these lines may be expected when the two diesel cars are placed in service in November.

DENMARK

Proposed New Route Between Norway and Denmark

As announced in THE RAILWAY GAZETTE of June 30, 1933, a new route between Norway and Denmark has been proposed. The route, which is shown on the accompanying map, will run from Kristiansand in Norway to Hirtshals in Denmark, replacing the present steamship service between Kristiansand Frederikshavn. The route, which will probably be opened in 1937, will be of considerably greater importance, when the Soerland railway from Oslo to South Norway is completed in 1938. The railway from Hirtshals to Hjørring is private, and has its own station in the latter town, but negotiations are in progress for running powers into the State railway station. The harbour in Hirtshals, which has recently been built, is now being extended to accommodate this traffic.

It has been announced that it is the Danish State Railways' intention, when more fast diesel articulated trains have been acquired, to run one of them from Hirtshals to the German frontier at Padborg and, if agreement is obtained, on to Hamburg. The total time from Kristiansand to Hamburg would thereby be reduced from 20 to about 10 hr. and the route would be the quickest from Oslo to the Western Continent and to Great Britain. There is no doubt that the new route will be of considerable importance for tourist traffic, and a heavy goods traffic is also to be expected, especially in artificial manure from Norway to Denmark. The postal traffic will use this route, too.

ARGENTINA

Transport Co-ordination in Buenos Aires

In addition to the general Co-ordination of Transport Bill, in which the railways are chiefly concerned, another, relating exclusively to the City of Buenos Aires, is also before the Argentine Congress. Both Bills were rushed through the Chamber of Deputies just before the close of the ordinary session, on September 30, and it was thought that the Senate, with a strong Government majority, would follow the lead of the Lower House. But the passing of the Bills by the Deputies, especially that relating to the City, created such an uproar, that the Senators changed their minds, and the Bills were sent to Committee, which means that they are shelved to all intents and purposes until the middle of next year.

Opposition to the Bill

Opposition to the City Bill came chiefly from the owners and drivers of the *colectivos* or small omnibuses, who struck work for several days. Moreover, not only the omnibus companies—or what remain of them, the majority having been forced into bankruptcy by those of the *micro* variety—but others interested in the automobile business, including selling organisations, service stations and garage proprietors, took every means in their power to signify their disapproval of the measure. The City Council also met, and by an almost unanimous vote, passed a motion to the effect that a strong appeal be made to the

Senate not to proceed with the Bill, thus proving once again how little respect the Councillors, mainly recruited from the ranks of the Socialists and Communists, have for schemes based on the promotion of law and order, discipline and the theory of the greatest good for the greatest number. The unjust treatment of the Anglo-Argentine Tramway Company for years past, entirely due to political intrigues of the vote-catching variety, is sufficient proof of this.

An Ill Wind

This long-suffering concern came into its own during the days of the *colectivo* and bus strike, as the ever-faithful tramway drivers and conductors were at their posts as usual, and additional services had to be run to accommodate the thousands who had to fall back on the electric trams, in the absence of their new love, the micro-omnibus. There was, in fact, an increase on the tramways of nearly two million passengers, as compared with the corresponding six days of the previous week. On the last day of the bus stoppage, September 30, they carried 1,307,945 passengers, as compared with 825,495 on September 23. The last figures refer to surface cars only, the increase in the travellers on the underground being in the neighbourhood of 25,000 a day.

Buenos Ayres Southern Dock Company

This company, which is closely allied with the B.A.G.S. Railway, has been ordered by Government decree, dated October 8, to extend its wharf frontage by 1,070 m. and also the corresponding section of road, to deepen the channel to a uniform depth of 7 m., and to keep free a strip of land 32 m. wide on each side. The contention of the Ministry of Public Works is that the concession, which was taken over by the present dock company in 1889, calls for 4,000 m. of channel and wharves, of which only 2,930 m. have been excavated and constructed. The dock company maintains that there is an agreement that the existing South Dock need be lengthened only when the yearly wharf movement on the first section exceeds 1,000 tons a lin.m., a situation which has not yet arisen. It asked for arbitration, but the Ministry does not consider that there is ground for any. In view of the fact that the existing dock provides ample facilities, it is hardly likely that the company will incur the great expense which compliance with the decree would entail, without making every effort to have the position reconsidered.

Railway Telegraph Service

The Government is being inundated with requests from railway telegraph operators all over the country for the repeal of the decree which forbids the operation of railway telegraph lines as a public service in places where a P.O. telegraph service is available, *vide* THE RAILWAY GAZETTE of May 24, 1935. It is estimated that this measure, which is due to come into force on October 15, will throw 1,600 men out of work, only a small proportion of whom are likely to be taken on by the Post and Telegraph Department. In addition to losing their billets, these men will forfeit their railway pensions, by automatically ceasing to become contributors to the fund, out of which many have obtained loans in order to purchase or build houses, and this further complicates the situation. Whatever the reason for the decree, which means a considerable loss of revenue to the railway companies, it entails a great hardship on the railway telegraphists, many of whom have served the companies faithfully for so long that they are on the verge of a pensionable age, and are now deprived of the opportunity of obtaining their full superannuation allowance. A certain proportion of the telegraph clerks will have to be retained to meet the requirements of the internal service of the railways, but wherever possible, telegraphic communication will be superseded by the telephone.

VICTORIA

The 1934-35 Report

The Victorian Government Railways Report for the year 1934-35 contains one or two items of particular interest. For instance, the standing time of locomotives per 1,000 miles run has been reduced from 22·4 to 17·0 hours during the past nine years, and in the same period the gross-ton-miles-per-train-hour figure has risen from 3,500 to 4,731, showing a marked improvement in goods train operating efficiency. Revenue from refreshment stalls and rooms and dining cars rose by nearly £20,000 during the year, totalling £290,733 in 1934-35. Bookstall receipts also increased by £3,357 to £61,279.

SPAIN

New Railway Law

The Parliamentary Commission which has been engaged for some time past on the preparation of a new railway Bill delivered its report to the Minister of Public Works on October 18, and it was placed before the Cabinet on October 21. It is understood that with very slight modifications the report will now be passed to the Secretariat of Congress to be drafted in the form of a Bill, which it is expected will be tabled in the Cortes before November 1, the appointed date.

The scheme covered by the report consists of fifteen clauses, and there are four minority reports. One of the most important and almost revolutionary clauses in the Bill, is that which declares the Statute of 1924 to have no legal binding force, except in any case such as may constitute a *fait accompli*, and so is impossible to modify or rectify. The railways therefore, in all general legislation, revert to the Railway Law of 1877, or to the laws of concession in individual cases. But as certain liabilities have been contracted on both sides under the operation of the Statute, the companies are given three months in which to present, in each case, their claims which will be considered by the Superior Railway Council and Council of State. Any company deciding to contest legally the decision of these bodies, forfeits any other benefits to which it might have been entitled under the scheme. As regards tariffs, the Bill retains the old system of maximum charges, but to the original maxima there will be added the 1918 and 1934 surcharges of 15 per cent. each and the 3 per cent. for the staff, making an authorised addition to the concession base rates, of 33 per cent. It is proposed to reduce the tax on passenger transport from 25 to 10 per cent., the tax on merchandise to remain at 5 per cent. The later legislation as regards the working day is modified in favour of the system prevailing before, under which "waiting" time counted for half the value in hours of "active" time.

General Terms of the Bill

The scheme provides for the issue of new capital, with State guarantee, or for independent bond issues, but in the latter case the service of interest and redemption is to come within the period of the concessions. The bond holders are to be syndicalised, and any arrangement between a company and a duly constituted syndicate is to have legal force. It is interesting to note that not only is there no tendency whatever to any further interference by the State, and much less any attempt at nationalisation, but that provision is made for the leasing to private enterprise, of the few small railways which are now being worked by the State. The scheme also provides for State aid in the cases of lines of public interest where the concessionary company is temporarily unable to meet working expenses.

This very interesting Bill may be said to be the first serious attempt to solve the railway problem in Spain since the Military Directorate imposed, by Decree, the unwieldy Statute which has now been declared to be lacking in legal force. The scheme is drafted in a practical way by practical railwaymen, as although some of the members of the Parliamentary Commission are Deputies of the Chamber, they have been chosen for their interest in, or knowledge of these problems. It remains to be seen what reception the Bill will have in the Cortes, and one can only hope that its progress may not be delayed or affected by political divergencies of opinion. From the point of view of the companies, while the Bill is not all that might be desired, it would, if it became Law, at least dispel doubts and legalise a position which has become intolerable.

XUM

THE REPAIR OF LOCOMOTIVE CONNECTING RODS—II

Details of the progressive system in use at the Horwich works of the L.M.S.R.

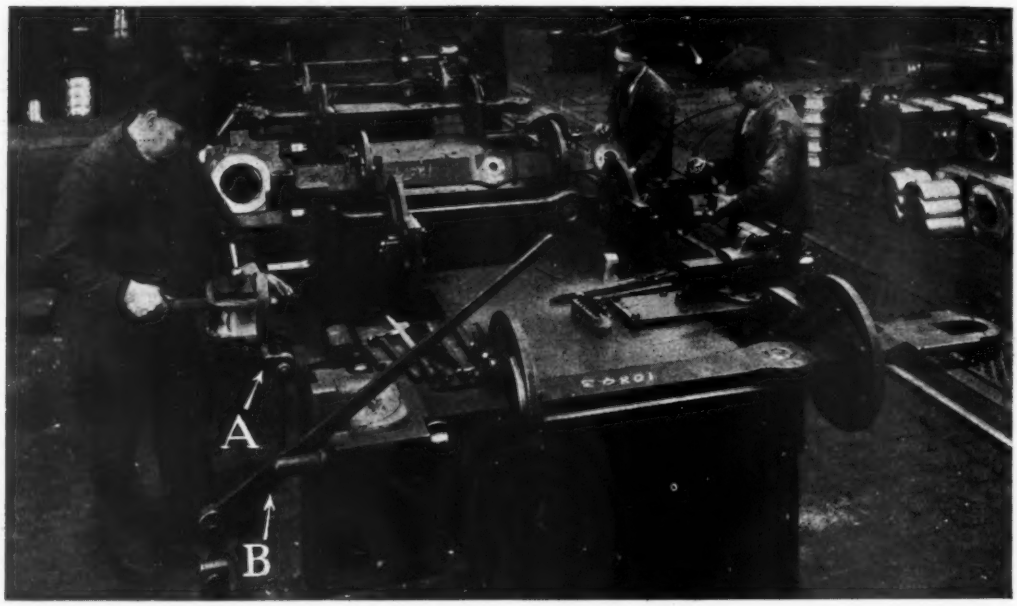


Fig. 8. Auxiliary fixture designed for handling big end brasses during fitting

AS was stated at the conclusion of the first part of the present article which appeared in our issue of October 25 the system followed at the Horwich Works in connection with the repair of locomotive connecting rods provides for certain preparatory operations before the rods are conveyed to the fitting section where work fixtures, similar in design to those used at the preparation stages, are situated. The designing of the fixtures and planning of the operations carried out by their aid necessitated a considerable amount of thought prior to the introduction of the system. This however has been fully compensated for by the results already achieved.

Work Fixtures in Fitting Section

In conjunction with these, Fig. 8, an auxiliary fixture A is also fitted which is specially designed for quick and efficient handling of the big end brasses during the fitting operation. This fixture, which is shown in detail in Fig. 9, is mounted on a cast iron support A and consists of a supporting bracket B bolted to the front of the support. The base plate C is hinged to the bracket B by the locking bolt D and it can be swivelled through 180 deg. and locked in any position by the handle E. An angle plate F on which the big end brass is supported can be revolved through 360 deg. in the opposite plane on the base plate C, and it is locked in position by the handle G. The brass is clamped in position on the angle plate by a spring loaded clamp H and locking bolt I.

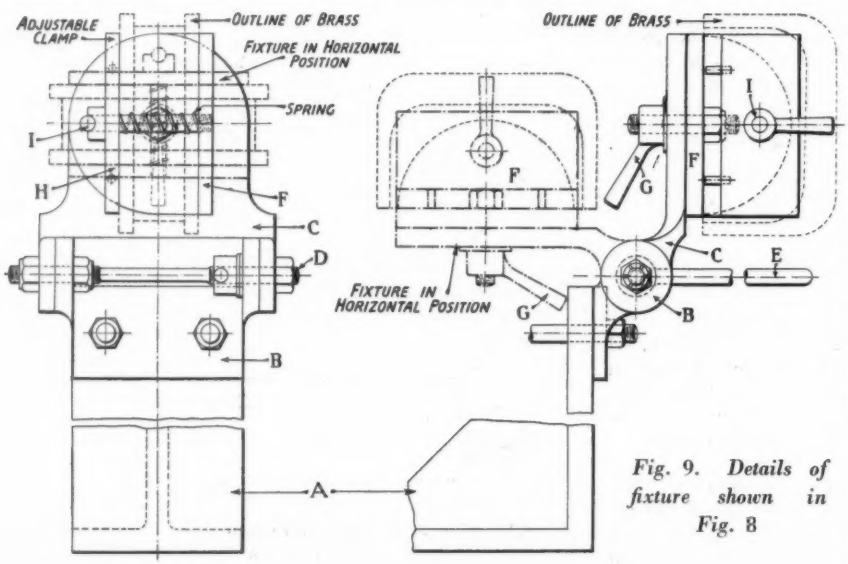


Fig. 9. Details of fixture shown in Fig. 8

This universal fixture, which is built up from mild steel plate thereby eliminating as much excessive weight as possible, is a decided improvement on the old method of using the vice, which entailed handling the brass to

obtain the various positions required and, further, the fatigue factor was one of the primary considerations when designing this fixture. The brasses are made a sliding fit in the housing of the rod, to ensure which they are machined in progressive sizes from No. 1 to 17, rising in increments of 0·015, in accordance with the gauges for the width of the housing. In cases where the housing of the rod does not require machining, the system of selective assembly is used in fitting the big end brasses. The old method of testing the brasses for the required fit consisted of using a wooden block or lead hammer to force the brasses in and out of the housing.

This method was considered unsatisfactory and also laborious, apart from the fact that a certain number of lead hammers were used in the process. In order to eliminate this method a special attachment, Fig. 8, B, was introduced and the design of this type of rod is such

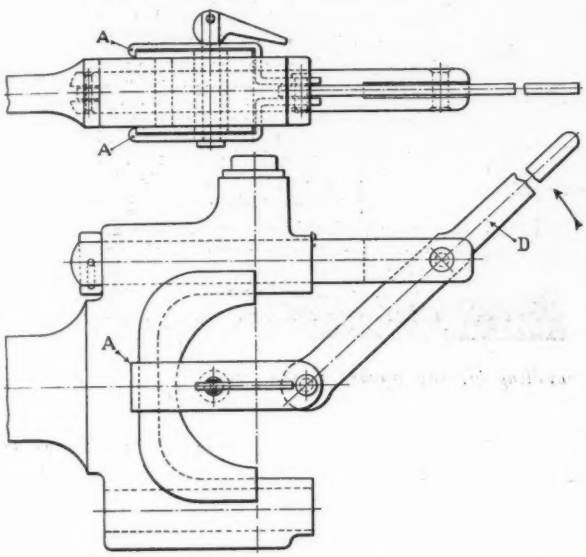


Fig. 10. *Attachment used for fitting big end brasses*

that one of the big end bolt holes is utilised to pivot the attachment. The latter, which is shown in detail in Fig. 10, consists of a pin A, which is mounted in the big end bolt hole and fastened by a cotter B with an elongated hole which swivels on the pin C. This enables the attachment to be easily and quickly withdrawn and inserted in the hole. A slot at the front end of the pin A engages the lever D by the fulcrum pin E, thus giving a leverage of 4 to 1. At the extreme end of the lever D two special clips F are hinged at G, and the pin H is used to lock the clips in position over the flange of the brass by the aid of a quick acting cam I. When inserting the brass in the housing, the pin H abuts against the crown of the brass, and when pressure is exerted on the lever D in a clockwise direction indicated by arrow, the brass is forced in position in the housing. To effect the withdrawal of the brass from the housing the clips are placed over the flange of the brass, Fig. 11, A, and locked in position by the cam as shown. To eject the brass from the housing, pressure is in the opposite direction on the lever D and withdrawal is easily and quickly effected.

After the big end brasses are fitted they are marked out from a datum line for the boring operation and then withdrawn and sent to a boring and surfacing lathe for the boring and facing operation. Special fixtures to suit each type of big end brass are employed for this operation

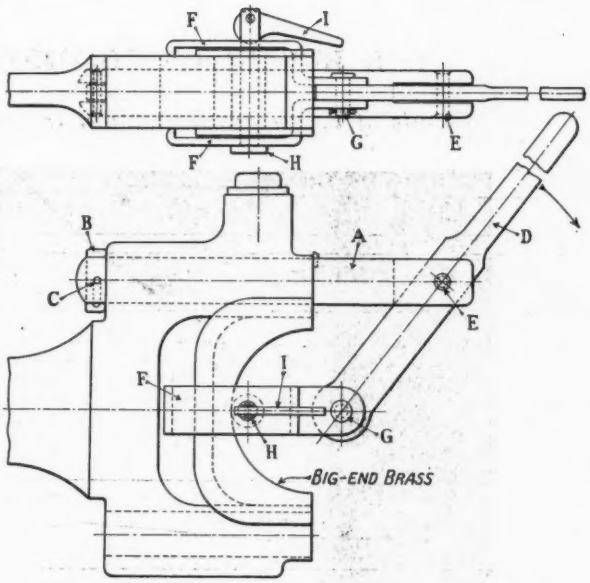


Fig. 11. *Method of withdrawing big end brasses*

and one of these is shown in Fig. 12. These fixtures are located on the faceplate of the boring and surfacing lathe, and the boring and facing operations are efficiently and accurately performed by this method. This fixture consists of a steel housing A in which the two halves of the brass are fitted. They are locked in position by the set screws B and also clamp plate C. Various sized blocks and strips are used to suit the different sizes of brasses dealt with.

The various fitting operations involved in the repair are now completed, *i.e.* fitting big end brasses bolts, fitting small end brasses and bolts, and so on. The rod is now taken out of the fixture by the aid of the lever lift and grab and conveyed to a radial arm drill for the boring and reamering of the small end brass or bush in position, and also the centre pin hole (A). A special fixture, Fig. 13,

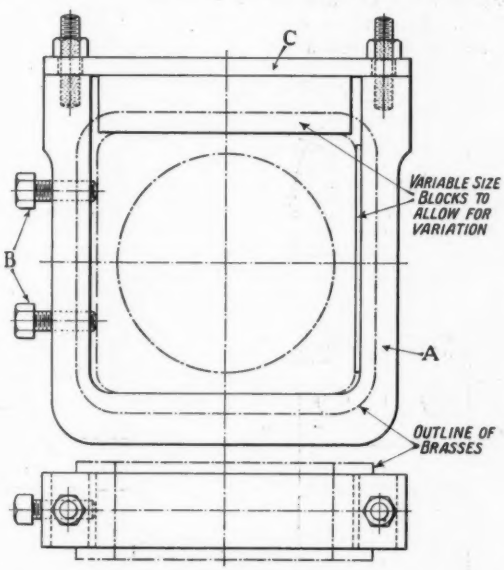


Fig. 12. *Fixture used in connection with boring and facing operation*

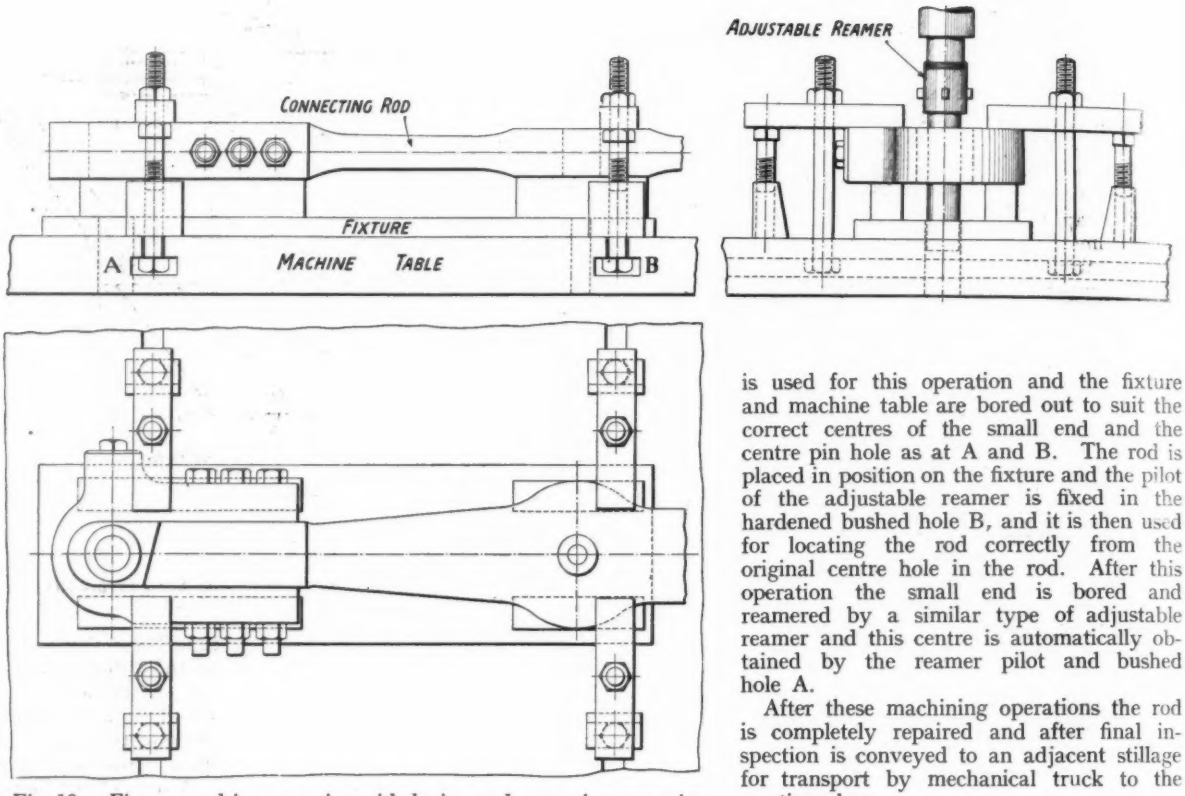


Fig. 13. Fixture used in connection with boring and reamering operation

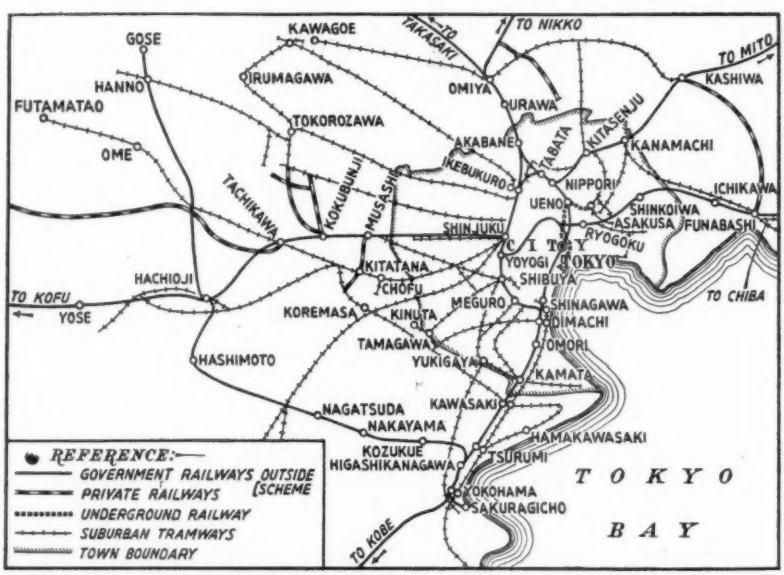
is used for this operation and the fixture and machine table are bored out to suit the correct centres of the small end and the centre pin hole as at A and B. The rod is placed in position on the fixture and the pilot of the adjustable reamer is fixed in the hardened bushed hole B, and it is then used for locating the rod correctly from the original centre hole in the rod. After this operation the small end is bored and reamered by a similar type of adjustable reamer and this centre is automatically obtained by the reamer pilot and bushed hole A.

After these machining operations the rod is completely repaired and after final inspection is conveyed to an adjacent stillage for transport by mechanical truck to the erecting shop.

Tokyo Transport Board Proposed

(From our special correspondent in Japan)

The amalgamation of all transport undertakings in and around Tokyo into an organisation similar to the London Passenger Transport Board is contemplated by the Japanese Government. Meetings have taken place at the Home Office between departmental chiefs of the Railway Ministry, the Home Office, the Ministry of Finance, the Tokyo Municipal Office, and the local railway and tramway companies. The preliminary project anticipates the formation of a company to control all railways, tramways, and buses, except the main lines of the Japanese Government Railways, but a traffic agreement between the Government Railways and the new company is to be concluded. The new board will also have the control of the electric light and power plants, real estate companies, and other ancillary services now owned by the local railway and tramway companies. The scheme involves a total property estimated at Y.600 million (£35,000,000), and covers the network of lines shown in the accompanying sketch plan. The taxi business of the city will not be absorbed, at any rate at present. A considerable amount of cut-throat competition is expected to be eliminated if the scheme is accepted. The board would consist of both Government and non-Government representatives, and the Chairman would be appointed subject to Government approval.



Sketch map of the area to be controlled by the proposed Tokyo Transport Board

NEW PACIFIC LOCOMOTIVES FOR SOUTH AFRICA

These locomotives, which have a maximum tractive effort of 35,572 lb. and 6-ft. diameter coupled wheels, are one of the most notable designs yet introduced for a 3 ft. 6 in. gauge railway. They are classified 16 E

As further evidence of the increased traffic recently experienced on the South African Railways, to which we referred when dealing with fifty new Class 19 C 4-8-2 type locomotives for the Union railway system in our issue of November 16 last year, we now illustrate a further improved locomotive design, this time of the 4-6-2 type, and intended for main-line passenger service.

These locomotives, an order for six of which has just been completed by Henschel & Sohn, A.G. of Kassel, represent in many respects a remarkable advance in size and power compared with others of the same wheel arrangement hitherto used on the railways of the Union of South Africa. To show how the new, Class 16 E, design compares with that of the same type immediately preceding it—the Class 16 DA of 1930—certain comparative dimensions are shown on the accompanying table. The new locomotives, like those to which we have above referred, have been constructed to designs and specifications prepared by Mr. A. G. Watson, Chief Mechanical Engineer, under the supervision of Mr. T. C. Swallow, the Advisory Engineer to the High Commissioner for the Union of South Africa in London. The engines will be used principally on the Cape Town-Johannesburg main line between Beaufort West, Kimberley, and Johannesburg, a distance of 617 miles, and in this connection it may be stated that the increase in the size of the coupled wheels has been made with the idea of allowing higher average speeds by the more important express trains when the track improvements now being made and contemplated are completed. These consist of the elimination or easing of grades and curves, and the substitution of a stronger roadbed with 96-lb. rails as against the present 80-lb. section, and the more extensive use of steel sleepers.

To attain an increase in tractive effort with the larger coupled wheels has necessitated the use of much larger cylinders, which are now 24 in. by 28 in. compared with 23 in. by 26 in. for the former Class 16 DA engines. This and the higher boiler pressure of 210 lb. per sq. in. have produced an estimated tractive effort of 35,572 lb. calculated at 75 per cent. of the boiler pressure, the standard factor used by the mechanical department of the Union railways.

The Boiler

A boiler of liberal proportions has been provided. The steel plates are of 0·2 to 0·3 per cent. nickel steel; the barrel is telescopic and has a minimum outside diameter of 6 ft. $3\frac{3}{4}$ in., and is constructed in three courses. The distance between the tube plates is 19 ft. $0\frac{1}{2}$ in., and there are 136 diameter steel tubes $2\frac{1}{2}$ in. in diameter, and 36 steel flue tubes $5\frac{1}{2}$ in. in diameter. The boiler barrel plates are $\frac{3}{4}$ in. thick, and for the firebox wrapper, throat and back plates, the thicknesses are $\frac{9}{16}$ in., $\frac{11}{16}$ in., and $\frac{9}{16}$ in. respectively. Steel which complies with the A.S.T.M. specification is used for the internal firebox, with a plate thickness of $\frac{5}{8}$ in. for the tube plate, $\frac{3}{8}$ in. for the wrapper and $\frac{7}{16}$ in. for the door plate. The M.L.S. superheater, which has a heating surface of 594 sq. ft., is made up of $1\frac{1}{2}$ in. outside diameter elements, which are attached to the combined header and front end throttle by means of through bolts and spherical seatings. The multiple valve throttle is placed on the saturated steam side and not on the more usual superheated steam side of the header.

The firebox has a complete installation of flexible stays of a type standard on the railway. A power operated Ajax firedoor is fitted, and the grate, which has an area of 62 sq. ft., is of the square-hole table pattern, and is fitted with power-operated shaking gear. The arch is supported by 5 arch tubes 3 in. in external diameter, contributing 26·5 sq. ft. of heating surface to the 212 sq. ft. in the firebox. The tubes and flues furnish together 2,701 sq. ft. of heating surface; thus, with the superheating surface of 594 sq. ft., the combined area reaches the high total of 3,534 sq. ft.

Steam to the superheater is taken through an internal steam pipe of 7-in. bore of special design as fitted to the new Class 19 C engines, but in this instance there is no room for a dome, its place being taken by a manhole with cover mounted on the near barrel section. The branch pipes from the superheater to the cylinders are 6 in. in bore. Two Gresham & Craven No. 13 injectors supply the feed through standard fittings on the top of the front section of the barrel, and the boiler is protected by two Ross pop valves pressed to blow off at 210 lb. per sq. in. The boiler and firebox are entirely clothed with Alfol insulation.

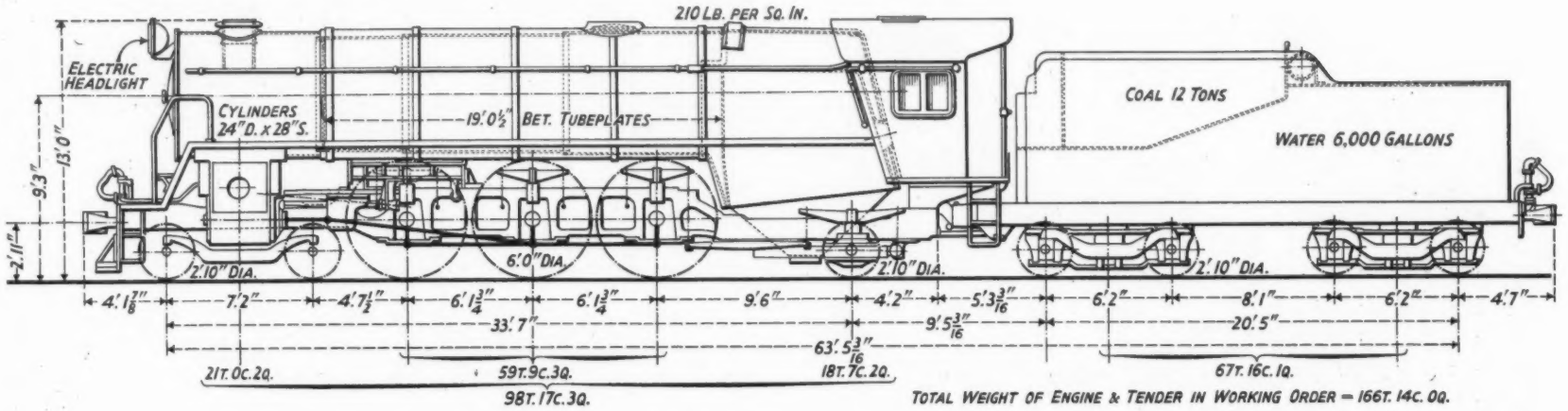
Cylinders and Motion

In common with all modern locomotives for the Union railways, each cylinder is cast integral with a half saddle supporting the circular smokebox, and the design is such that each casting is interchangeable, the front and hind covers being of equal diameter. Special attention has been given to the design of the steam and exhaust passages to ensure an unrestricted flow of steam to the cylinders and a free exhaust. The double-seated poppet valves are housed in pockets at each end of the cylinders, the arrangement being such that the ports between the valves and the cylinder barrels are both short and straight. For the admission valves the diameter is 8 in., and the exhaust valves are 9 in. in diameter. The R.C. poppet valve gear supplied by Associated Locomotive Equipment Limited is of the latest design, and most of the details, particularly those going to make up the main drive and the reversing gear, interchange with similar parts used for the new Class 19 C engines, and also for 20 4-8-2's Class 15 E now being constructed by R. Stephenson & Co. Ltd., Darlington. The cylinders for the Class 16 E engines also interchange in every respect with those for the new 4-8-2 type mentioned.

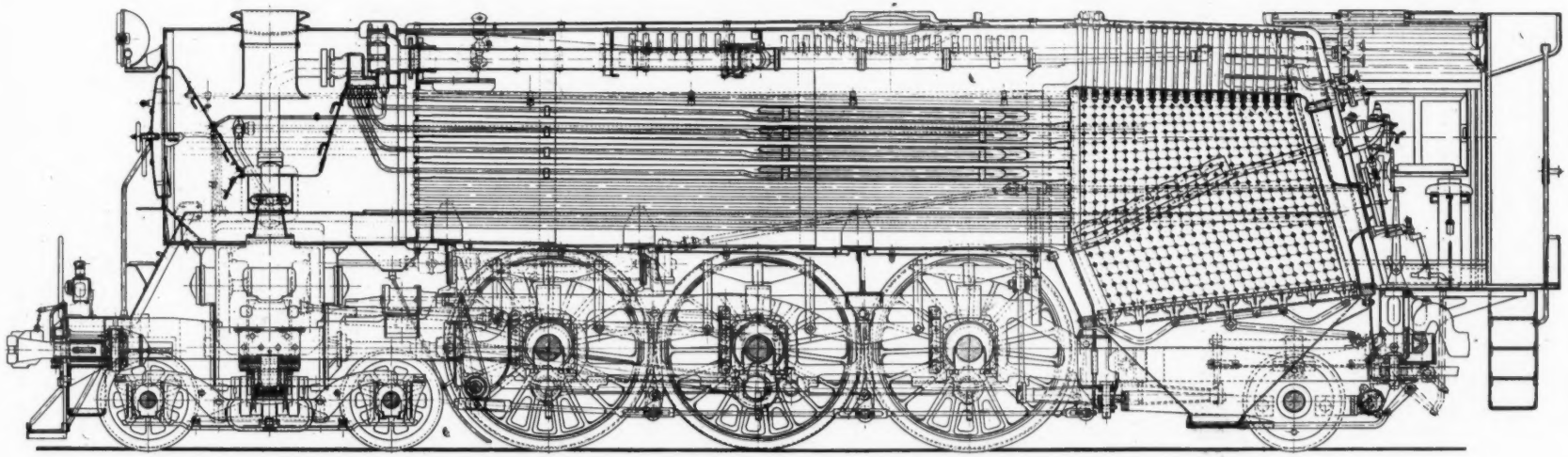
The camshafts are arranged to provide admission rates ranging between 15 per cent. cut-off to 85 per cent. in full gear, while when in centre gear all the valves are opened and a by-pass position provided for use when "drifting" down the long grades frequently met with on the South African Railways. The whole of the cam gear and the operating gears are lubricated by oil bath, and the oil supply for the valve spindles is provided from a Wakefield "Eureka" lubricator in the cab, which also supplies oil to the cylinder barrels.

The inner and outer valve seatings in the cylinder castings are renewable, and cast iron liners are fitted in the

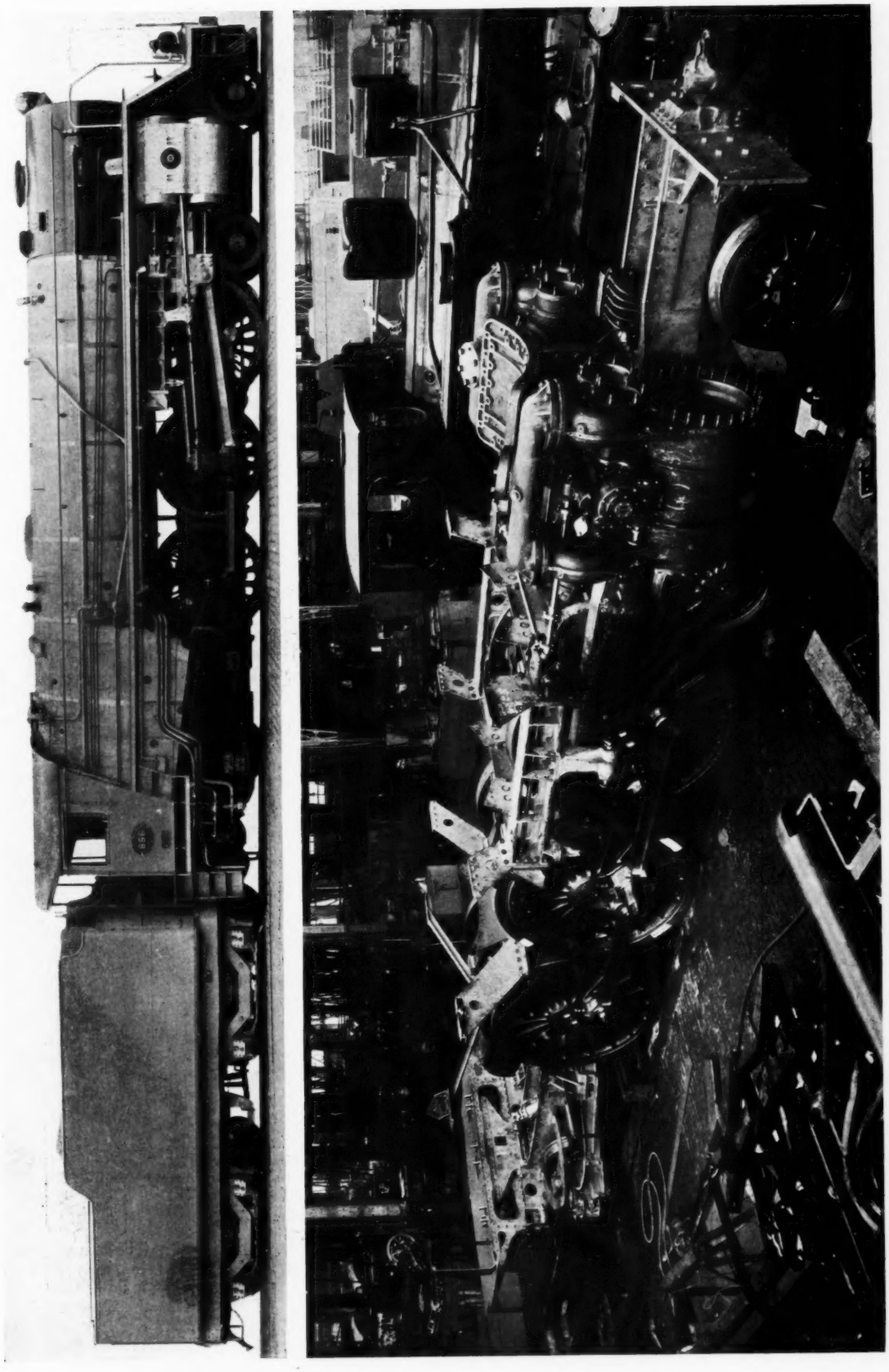
NEW PACIFIC LOCOMOTIVES FOR SOUTH AFRICA



Drawing showing overall dimensions and weight distribution of 4-6-2 type locomotive for the South African Railways



Sectional elevation showing arrangement of boiler and firebox



Above: New 4-6-2 type express passenger locomotive, South African Railways. Below: View of the engine partly completed in the works of the builders, Henschel & Sohn, Kassel

cylinders. The main drive for the cam gear is the R.C. duplex, each set consisting of a return crank gearbox fitted with worm and wheel increasing gears coupled to high speed universal drive shafts; the latter extend forward to the camboxes, which are bolted to the cylinders between the front and rear valve pockets. Greasing nipples are fitted for the wormshaft bearings in the return crank gear casings, the bearings in the intermediate bearing brackets, and also the universal fixed and sliding joints in the driving shafts.

The pistons are of the Wota type manufactured by the engine builders. In this design each piston is composed of a bull ring and two forged steel discs, and the latter when riveted together fit over a double-coned fit machined on the piston rod. The two bar guides have underhung crossheads with two side pieces of forged steel, which when bolted together grip the piston rod with a similar type of fit to that used for the piston head. This is a very effective method of fixing the piston and crosshead, and obviates the usual piston rod, nut and the cotter at the crosshead end.

The connecting and coupling rods made from forgings of special chrome-nickel alloy steel are of fluted section, and are designed to be as light as possible, consistent with strength and the provision of proper bearing surfaces for the main crank-pins and for the coupling rod pins. Floating bronze bushes are applied to the main crank-pins and the coupling rod pins. All the pins are hollow bored. Grease lubrication is used for the motion and the axleboxes of the coupled wheels. The balancing crescents cast in the coupled wheel centres are hollow, and formed in such a way that they may be filled with lead sufficient to balance the revolving masses and either 20, 30, 40 or 50 per cent. of the reciprocating parts, as practice may prove to be required for satisfactory running.

As delivered, the reciprocating parts are balanced to the extent of 20 per cent. of their weight. The tyres for the main driving wheels are without flanges. The leading four-wheeled bogie is of the swing-link type; the lateral control is effected by laminated springs, and springs of the same kind take the weight through the usual form of compensating beams.

Overhung laminated springs take the weight on the coupled axles; the pedestals are of the usual saddle type used with bar frames. A Cole pattern trailing two-wheeled truck takes the weight at the rear. The truck frame swings about a centre just behind the trailing coupled axle and is centred by suitable coil springs. Equalising beams pivoted in brackets bolted to the main frames connect the truck bearing springs with those for the trailing coupled axle. The spring suspension for the coupled axles is equalised throughout.

The main frames are machined from heavy rolled mild steel plates, and each side is in one piece from the front bumper to the rear under the footplate. A steam brake operates on the coupled wheels; it is applied through compensated rigging, and works in conjunction with a two-cylinder vacuum brake acting on the tender for which the Vacuum Brake Company's ejector and brake cylinders are used. Alliance couplers are fitted on the engine and tender. The tenders are generally similar in all respects to those supplied with the Class 19 C engines, which were fully illustrated in our issue of November 16. They are large for a 3-ft. 6-in. gauge engine, having space for 12 tons of coal and 6,000 imperial gallons of water. The tanks, which are carried on an underframing of rolled steel sections, are constructed of copper bearing steel plates to resist rust.

The engines are of imposing appearance, and their general proportions are shown by the diagram drawing, from which it will be seen that the boiler centre stands 9 ft. 3 in. from the rails, and that the total length is 72 ft. 2½ in. over coupled faces. The engines were shipped to Cape Town and re-erected at the Salt River workshops. A complete list of the leading dimensions is appended.

S.A.R. 4–6–2 Type Locomotives Class 16E
Dimensions and Ratios

(*Dimensions of Class 16DA shown in brackets for comparison*)

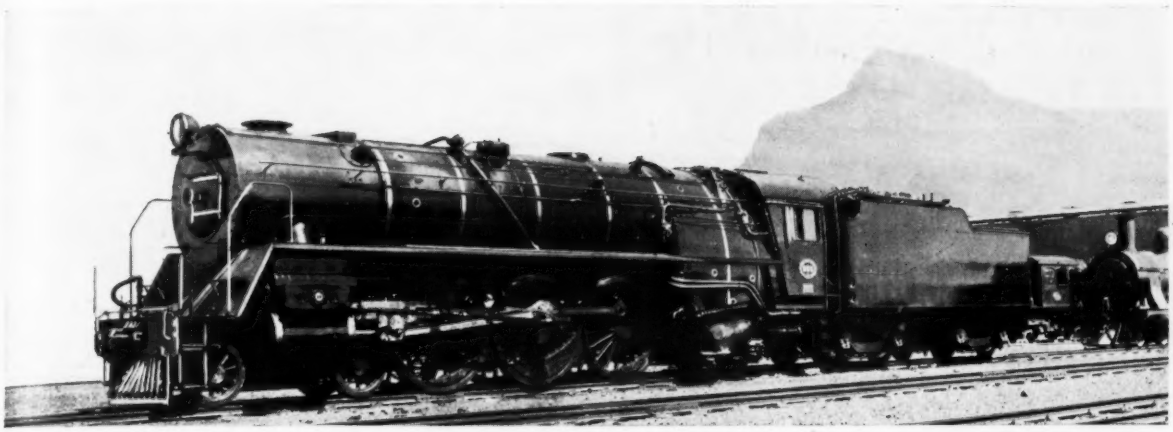
Date built	1935 (1930).	
Service	Express passenger (do.).	
Cylinders diameter and stroke, in.	24 in. × 28 in. (23 in. × 26 in.).	
Valves, type	Poppet (Piston).	
,, diameter inlet .. in.	8.	
,, ,, exhaust .. ,,	9.	
Rated tractive force	35,572 lb. (33,530 lb.).	
Wheels, diameter—		
Leading bogie	2 ft. 10 in.	
Coupled	6 ft. 0 in. (5 ft. 0 in.).	
Trailing truck	2 ft. 10 in.	
Boiler—		
Smallest diameter outside	6 ft. 3¾ in.	
Length between tube plates	19 ft. 0½ in.	
Heating surfaces, sq. ft.—		
Tubes and flues	2,701·5.	
Arch tubes	26·5.	
Firebox	212·0.	
Total evaporative	2,940·0	(2,573·0).
Superheater	594·0	(668·0).
Combined	3,534·0	(3,241·0).
Grate area	62·0	(60·0).
Steam pressure	210 lb. per sq. in.	(195 lb.)

Weights—	Tons c. q.	
On leading bogies	21 0 2	
On coupled axles	59 9 3	
On trailing axle	18 7 2	
Total engine	98 17 3	(90 1 0)
Tender capacity, coal	12 0 0	(12 0 0)
,, weight, full	67 16 1	(66 10 0)
,, ,, water, gal.	6,000	(6,000)

Ratios

Engine weight ÷ combined h.s.	=	62·5.
Adhesive weight ÷ engine weight	=	per cent. 60·3.
Adhesive factor	=	3·76.
Rated tractive force × driving wheel diameter ÷ combined heat surface	=	726.
Superheater surface ÷ combined heating surface	=	per cent. 16·8.
Combined heating surface ÷ grate area	=	57·0.
Firebox heating surface ÷ grate area	=	3·42.
Firebox heating surface ÷ combined heating surface	=	per cent. 6·0.

Shortly after the first engine of the new class, No. 854, had arrived at Cape Town, an experimental run was made over the main line to Wellington and back, with a train of eight bogie vehicles weighing 277 tons. As, up to that time, the locomotive had run only 45 miles, and as the running-in stage was far from complete, no attempt was made to "extend" it, the outward journey being completed under easy steam. On the return journey, however, fast running was more freely indulged in, with the result that, for what is probably the first time on record on the 3 ft. 6 in. gauge, a maximum speed of 70 m.p.h. was reached. This, moreover, was on the level stretch of track about 6 miles out of Cape Town, and not on any of the steeply falling gradients further north. On the two adverse stages of Klapmuts bank, both at 1 in 80, the minimum speeds were 44½ and 45 m.p.h., the bank having been begun at 54 m.p.h., and the 6·6 miles from Paarl (passed at a reduced speed of 35 m.p.h.) to Klapmuts were covered in 7 min. 7 sec., at an average of 55·6 m.p.h., notwithstanding the fact that they include 4½ miles rising continuously at 1 in 230-110-80. From



New 4-6-2 type engine at Paarden Eiland running sheds, Cape Town

Kraaifontein to Woltemade No. 1 signal-box, the 14·4 miles were covered in 15 min. 28 sec.; there was a maximum of 67 m.p.h. between Kraaifontein and Bellville, and speed ranged for some distance beyond Bellville at about 63 m.p.h.; after a slowing to 56 m.p.h. at Elsie's River, there was a rapid acceleration, which resulted in the covering of a full half-mile at 69·5 m.p.h., and a momentary maximum of 70 m.p.h. Thus, from Wellington, Paarl, 9·3 miles, was passed in 13 min. 39 sec., Mulder's Vlei (after a severe and prolonged permanent way relaying check to 13 m.p.h.), 19·5 miles, in 29 min. 17 sec., Bellville, 33·1 miles, in 44 min. 19 sec., and Bay Junction, 43·2 miles, in 56 min. 35 sec., or about 54 min. net. The 45·3 miles from Wellington to Cape Town were run in 61 min. 42 sec., or 59 min. net, whereas the Union Limited is allowed 75 min. over this section; it has to be remembered, however, that the latter may load up to 420 tons, as compared with the 277 tons hauled on this occasion. As reported in THE RAILWAY GAZETTE of October 25, No. 2643, a 4-8-2 locomotive of Class 19 C, recently made the Wellington-Cape Town journey on an experimental run in 54 min. 2 sec., or 50½ min. net, maintaining a speed of 60 m.p.h. up short 1 in 80 gradients, but with a load of 131 tons only, and with the engine considerably more extended than on this trip with No. 854.

L.M.S.R. Catering at Johannesburg

Restaurant du Soleil at Gleneagles Hotel, Perthshire, which is to form the model for the Empire Exhibition to be held next September in Johannesburg, and for which the L.M.S.R. is making catering arrangements (*see news article on page* 847)

XUM

RECENT DEVELOPMENTS AT INCHICORE LOCOMOTIVE WORKS, GREAT SOUTHERN RAILWAYS, IRELAND

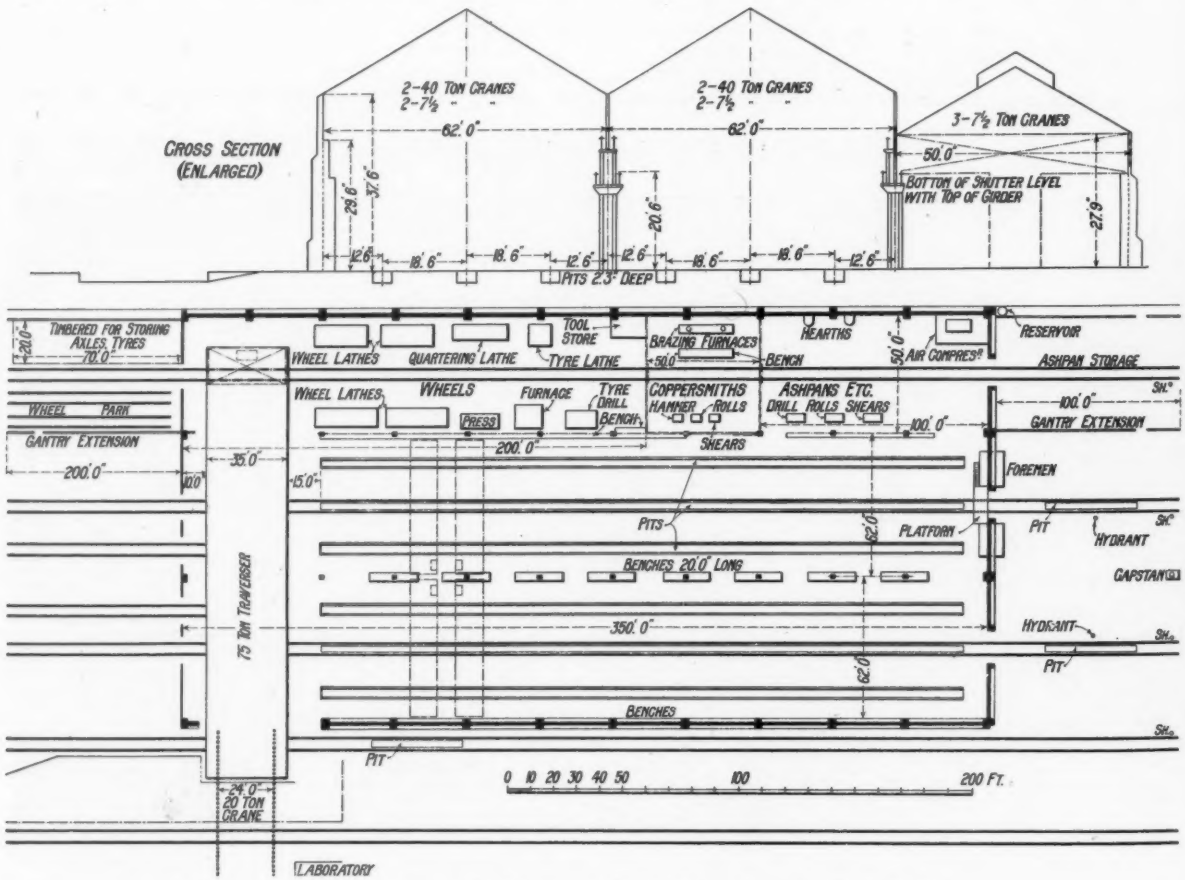
A new locomotive repair shop, designed and equipped on the most modern lines, has been added to the existing plant

IN order to place the work of building and repairing locomotives on an up-to-date basis, a new shop, designed and equipped throughout on the most modern lines, has been constructed at Inchicore works, Dublin, the headquarters of the Great Southern Railways Locomotive Department and incidentally the largest railway works in the Irish Free State.

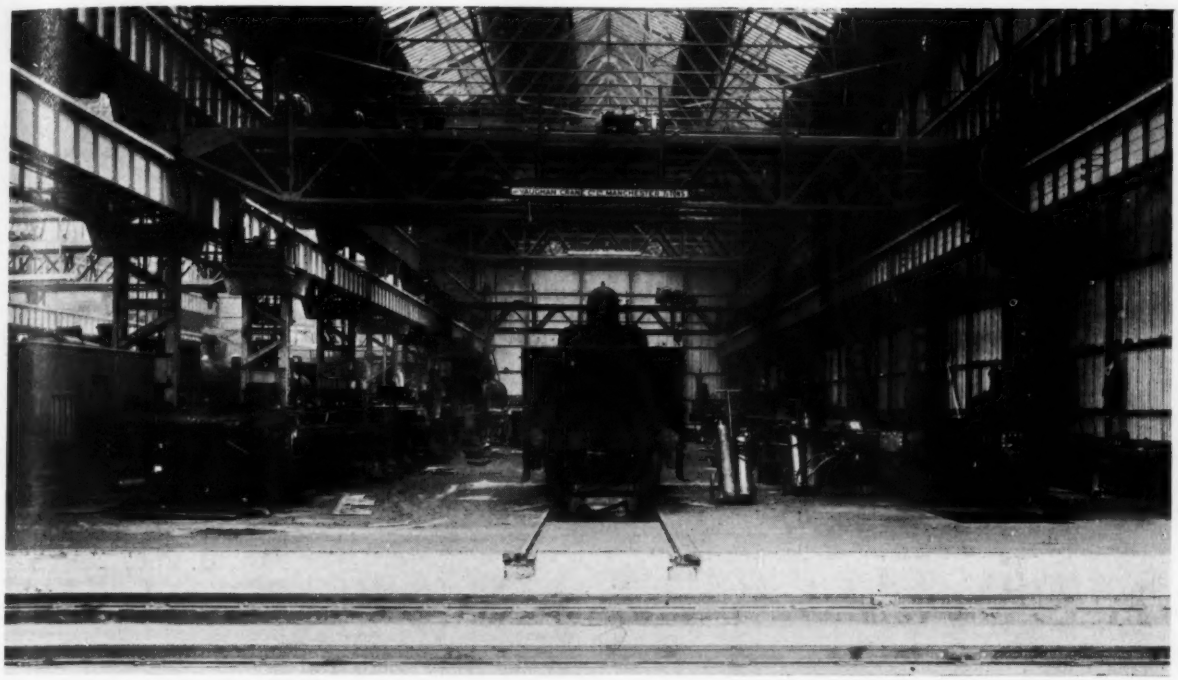
The shop now brought into use is 350 ft. long by 174 ft. wide, and comprises three bays, two of which, each 40 ft. wide, are equipped with two 40-ton electrically operated overhead travelling cranes, having 10-ton auxiliary hoists, supplemented by two 7½-ton cranes of a similar type running on separate gantries below the 40-ton cranes. The third bay, 50 ft. in width, is equipped as a wheel shop and is provided with a wheel press, wheel lathes, tyre boring lathe, tyre studding machine, and a journal lathe; this installation is served by two overhead cranes each of 7½-tons capacity. A coppersmith's shop is also provided, and the remaining portion of the bay is utilised for the repair of locomotive cabs, smokeboxes, ashpans, and other similar work. The crane gantry at this point extends outside the building and operates over a space reserved for the storage of material. A 75-ton traverser is provided at one end of the shop for the handling of locomotives and boilers, and extends across three bays. It is fitted with an electrically operated capstan and facilitates the rapid transfer of locomotives and boilers in and out of the shops.

The crane installation and the traverser were manufactured and supplied by the Vaughan Crane Co. Ltd. of Manchester. The main hoist is fitted with Vaughan patent Variospeed control, specially developed for this installation, and has proved very successful in use. A commutator motor is made use of for the hoist motion, of which the brushes are operated by a pilot motor, having in conjunction with it a limit switch and gear reduction drive. Variable speed control is obtained in the commutator motor by varying the position of the brushes on the face of the commutator, the latter being connected to a secondary winding of low voltage.

A simple industrial pattern drum controller of special construction is arranged to serve the dual purpose of controlling the main motor and the pilot motor at one operation. It has three notches, the first switching the main motor across the line, and leaving the brush gear in the slow speed position. A movement of the controller



Arrangement of new shops at Inchicore works, Dublin, Great Southern Railways



General repair bay looking west. Stripping locomotive in foreground

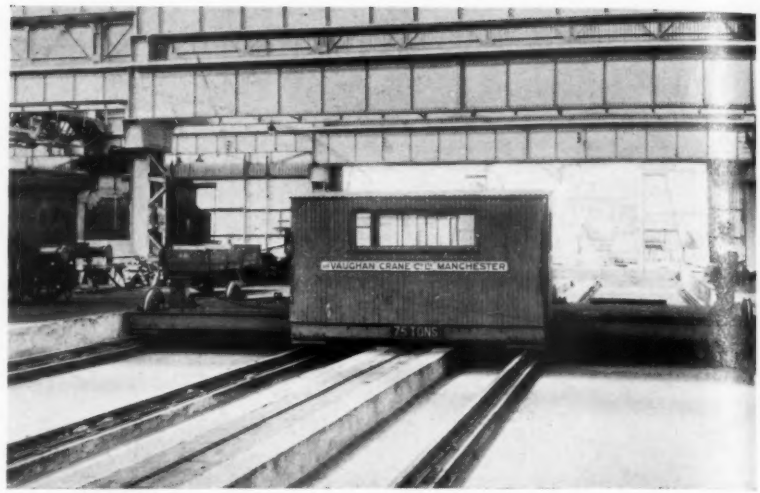
Axlebox fitting and light repair bay, looking west

INCHICORE LOCOMOTIVE WORKS, GREAT SOUTHERN RAILWAYS, IRELAND

from the first notch to the third notch sets the pilot motor in operation, and the brushes begin to travel across the face of the commutator. By a return to No. 2 notch, any intermediate speed can be obtained, as on this notch the pilot motor is instantly stopped and the brushes remain in the position they have attained whilst on No. 3 notch. Similarly, in the reverse direction, the speed can be lowered by returning to No. 1 notch, and, if the ultimate dead-slow speed is not required, a return to No. 2 notch will give the desired intermediate speed. This system provides solely for the electrical control of the brush gear operating mechanism, and no resistances whatever are used.

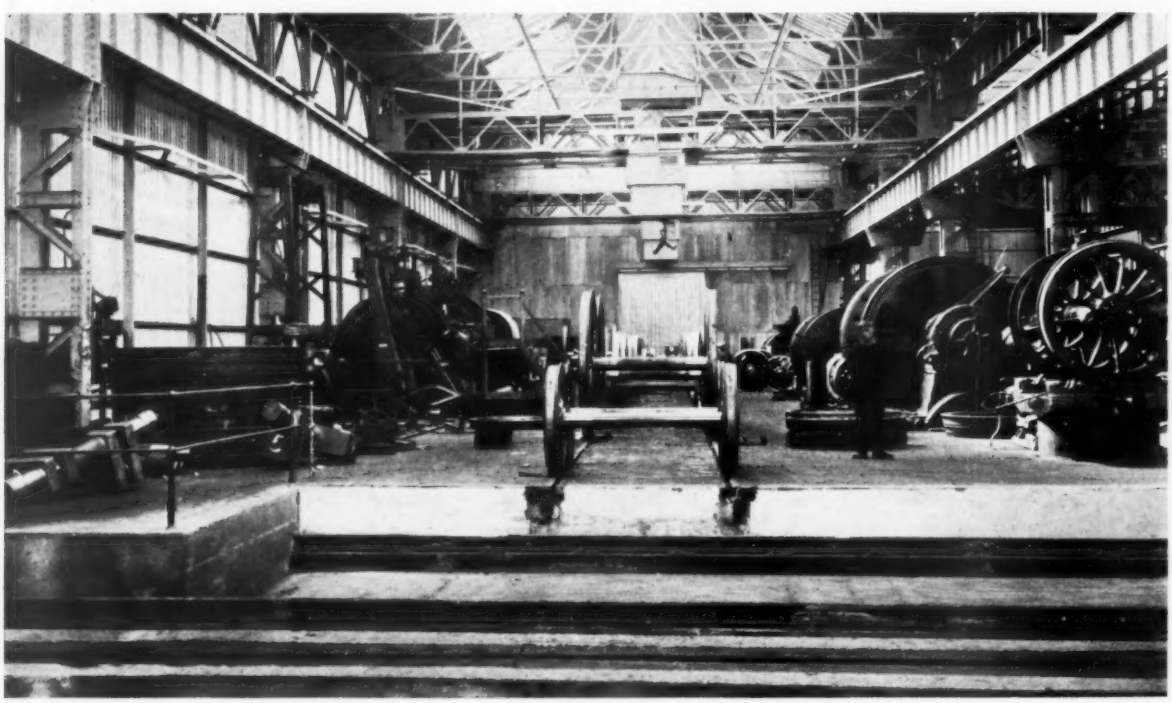
The economy in current consumption on low speeds is very marked as compared with ordinary slip ring motors or d.c. machines, and it has the further advantage in that as the acceleration is outside the control of the operator, the controller can be put through to the third notch when full speed is required, the acceleration being automatic and consequently foolproof. Loads of 40 tons can be raised at a speed of 8 in. per min. if required.

The original erecting shop has been transformed into a modern boiler shop in which repairs to boiler barrels, mounting, testing, and lagging are carried out as consecutive operations. The boiler enters the shop at one end where stripping takes place, and next proceeds along one bay of the shop, during which time boiler barrel repairs are attended to. The boiler then returns by way of another bay in which mounting, testing, and lagging are completed, and the finished boiler arrives at the same end of the shop at which it entered, being then available for ready transfer to the erecting shop for fitting to an engine or for placing in stock. Boilers are handled between the old shop and the new erecting shop by means of a Vaughan 25-ton overhead electric crane. The new erecting shop is electrically fitted throughout and steam heating, gas, and compressed air services are also provided.



Traverser in erecting shop, and 25-ton overhead crane

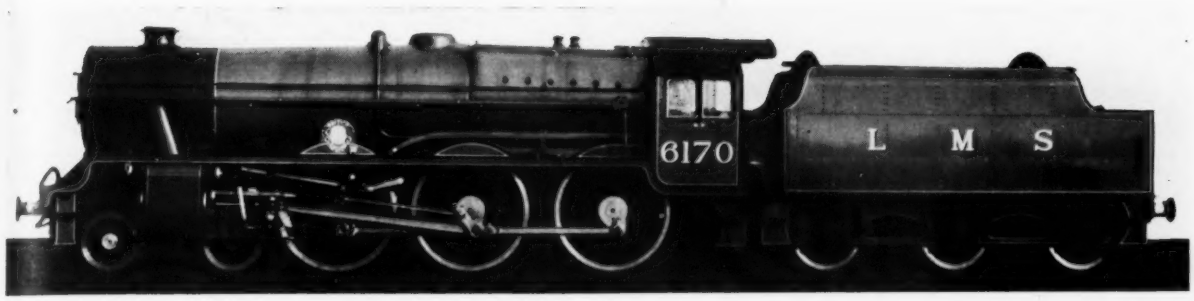
The machinery in the wheel shop referred to above was supplied by the following contractors: wheel presses, Fielding & Platt Limited; tyre boring lathe, Craven Bros. Ltd.; tyre studding machine, Wm. Asquith Limited; journal lathes, Craven Bros. Ltd. The steelwork for the gantries was supplied and erected by P. & W. MacLellan Limited of Glasgow, and fabricated by the Dublin Dockyard of Vickers (Ireland) Ltd.



General view of wheel bay in new erecting shop at Inchicore works

THE "BRITISH LEGION" ENGINE, L.M.S.R.

A "Royal Scot" class locomotive rebuilt at Crewe with taper boiler and officially named on Tuesday by Lord Jellicoe



THE first of the "Royal Scot" class locomotives of the London Midland & Scottish Railway to be rebuilt with a taper boiler has recently been turned out of the Crewe shops. It bears the number 6170 and the name *British Legion*. Other features associated with the design and practice introduced by Mr. W. A. Stanier, the Chief Mechanical Engineer have also been incorporated. The principal difference between the engine illustrated and the original "Royal Scots" with parallel boilers is in the distribution of the heating surfaces, the figures for both engines being as shown in the table below:—

	Original "Royal Scots"	Engine No. 6170
Working pressure (lb. per sq. in.)	250	250
Firebox heating surface (sq. ft.)	189	195
Tube heating surface ,,	1,892	1,669
Superheating heating surface ,,	399	360
Combined heating surface ,,	2,480	2,224
Grate area .. .. ,,	31·2	31·25

The tractive effort remains as before, namely 33,150 lb. at 85 per cent. of the boiler pressure. In the construction of the boiler, the barrel and firebox wrapper plates are made of 2 per cent. nickel steel. The barrel is tapered and provided with a steam dome in which the regulator is situated, the company's standard form of top feed being located on a separate manhole cover in front of the dome. The cylinders are of the same diameter and arranged as in the original engines; the inside cylinders have, however, been modified in order to provide a saddle to carry the smokebox in view of the fact that the tubeplate is now of the drumhead type. Except for minor alterations the motion is the same as for the original engines.

The bogie is provided with side bolsters to transmit the load through the main frames of the bogie, the sliding faces of these side bolsters being provided with Ferobestos pads. Grease gun lubrication is used on the brakegear, intermediate buffing gear and also on the tender hand brake and gear for operating the pick-up.

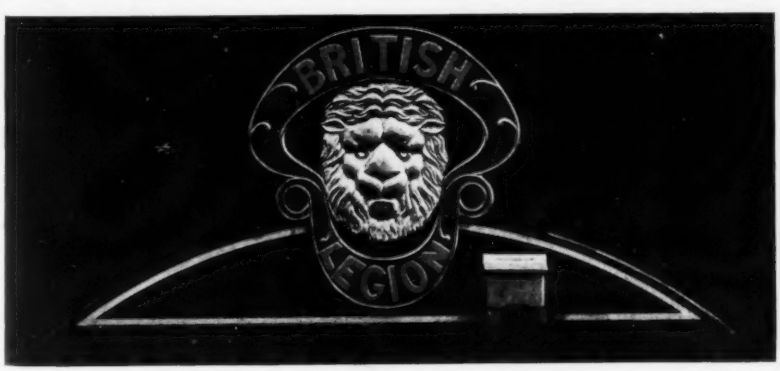
The weight of the engine itself remains as before, namely 84 tons 18 cwt. in working order, but the total weight of the engine and tender in working order is increased from 127 tons 12 cwt. to 139 tons 11 cwt., the additional weight being accounted for by the fitting of the new standard 4,000 gallon type tender which has a coal capacity of 9 tons. The tenders originally fitted had a water capacity of 3,500 gallons and coal capacity of 5½ tons, the weight of the tender in working order then being 42 tons 14 cwt.

The locomotive was officially named at Euston on Tuesday last, when Admiral of the Fleet, Earl Jellicoe, performed the ceremony on behalf of the British Legion, of which he is Vice-Patron, in the presence of 250 of its members. On his arrival, Earl Jellicoe, accompanied by the Chairman of the L.M.S.R., Sir Josiah Stamp, and by General the Hon. Sir Herbert Lawrence, a Director of the company, inspected the guard of honour formed by 50 standard bearers of the British Legion. After brief addresses had been made by Sir Josiah Stamp and Sir Herbert Lawrence, Earl Jellicoe unveiled the name plate of the engine, incorporating the badge of the British Legion; the band of Hornsey branch of the Legion thereupon struck up the "Boys of the Old Brigade." Among those of the British Legion present were:—

Major-General Sir F. Maurice (President); Admiral R. S. D. Cuming, Lord Derby, Brig.-Gen. Viscount Hampden, Major Claude G. Martyn, Col. Lord Vivian (Vice-Presidents); Major F. W. C. Fetherston-Godley (Chairman).

The following directors and officers of the L.M.S.R. were present:—

Mr. E. B. Fielden (Deputy Chairman); Mr. A. E. Pullar (Director and Chairman of Scottish Local Committee); Sir Thomas Williams, Mr. Douglas Vickers, and Mr. W. L. Hichens (Directors); Sir Harold Hartley and Mr. E. J. H. Lemon, (Vice-Presidents); Mr. H. L. Thornhill (Chief Legal Adviser); Mr. O. Glynne Roberts (Secretary, and Assistant to President); Mr. H. V. Mosley (Chief Executive Officer for New Works and Parliamentary Business); Mr. G. L. Darbyshire (Chief Officer for Labour and Establishment); Mr. C. R. Byrom (Chief Operating Manager); Mr. W. A. Stanier (Chief Mechanical Engineer); Mr. G. H. Loftus Allen (Advertising and Publicity Officer); Lt. Col. E. ff. W. Lascelles.

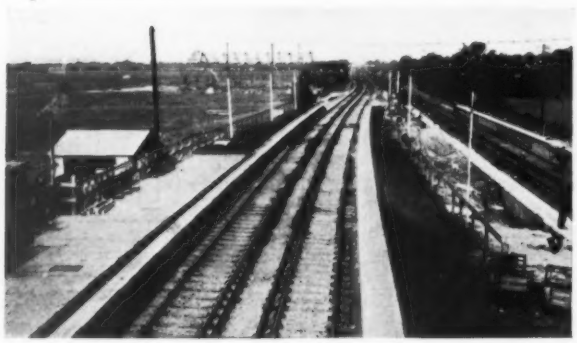


Name plate of the L.M.S.R. "Royal Scot" class locomotive "British Legion," which was unveiled by Lord Jellicoe on Tuesday

XUM

Rail and Air Co-ordination

A Railway Air Services plane as used on the Manchester–Isle of Man route



The new Tinsley Green Southern Railway station being built to serve the new adjacent airport at Gatwick

The covered way, in the course of construction, which will connect the airport buildings with Tinsley Green station

A general view of the Martello-type building now in the course of construction at the new Gatwick airport

Shoreham airport building. Railway Air Services planes used this airport throughout the summer, and a special airport halt has been provided nearby on the Southern Railway's electrified Brighton–Worthing line in order to give a co-ordinated rail and air service

RAILWAY NEWS SECTION

PERSONAL

Mr. G. V. O. Bulkeley, C.B.E., General Manager, Nigerian Government Railway, is expected to arrive in England on a short visit on November 23.

From the *London Gazette* of November 8: Lt. Col. (Hon. Col.) (Hon. Brig. Gen.) Sir George L. Colvin, Kt., C.B., C.M.G., D.S.O., V.D., A.D.C. to the King, has resigned his commission. Sir George was at one time Agent of the East Indian Railway.

INSTITUTE OF TRANSPORT

The following corporate members and associate members have been elected during the summer and early autumn :—

Members

Mr. F. C. Cook, Chief Engineer, Roads Department, Ministry of Transport.
Mr. T. B. Hare, District Superintendent, Darlington, L.N.E.R.
Mr. C. R. S. Harris, Director-General, Buenos Ayres Great Southern & Buenos Ayres Western Railways.
Mr. C. M. Hoffe, Chief Superintendent (Staff), South African Railways & Harbours.
Mr. F. V. McGee, Stores Accountant, New South Wales Government Railways.
Mr. H. E. Roberts, District Passenger Manager, London, L.M.S.R.
Mr. W. F. Veary, System Manager, Cape Town, S. A. R. & H.
Mr. R. S. Vipan, Deputy Traffic Manager, Assam-Bengal Railway.

Associate Members

Messrs. O. Aiken, N. E. Goodhead, A. P. Hunter, T. G. Jones and S. G. Spiller, L.M.S.R.; R. A. Harrison and J. M. Leighton-Bailey; C. H. Lott and E. Tyler, L.N.E.R.; W. J. Wilford, G.W.R.; E. Maynard, Port of London Authority; E. E. Chaseling, New South Wales G.R.; C. T. Jackson and N. A. Paterson, S.A. R. & H.; A. S. Matthews, Central Argentine Railway; J. D. Michael, East Indian Railway; J. C. Wightwick, Great Indian Peninsula Railway; and A. C. Wren, Buenos Ayres & Pacific Railway.

Mr. Christopher Horsley Whitelegge, who, as already announced in THE RAILWAY GAZETTE of November 8, has been appointed General Assistant and Parliamentary Agent, Great Western Railway, is a grand nephew of Mr. Isambard Kingdom Brunel. He was educated at Charterhouse and on the Continent and after some legal experience in the City entered the service of the Great Western Railway, in October, 1912. After serving in France from May, 1915, to February, 1918, mainly with the 18th Division, he rejoined the G.W.R. in 1919 and now succeeds the Parliamentary Agent, Mr. H. F. A. Hoskins, who retired on October 31 last.

Mr. J. A. Bell, Divisional Superintendent and recently Deputy Agent (Organisation) of the East Indian Railway, took over charge as Agent from Mr. A. C. Venables, M.C., V.D. on October 16. Mr. Venables has proceeded on leave prior to retirement.

Mr. Bell was born in 1887 and began his official career in India as an Assistant Engineer on the North Western Railway in 1910. He was first employed upon the construction of the new locomotive, carriage and wagon shops at Moghalpura, Lahore, but four years later was posted to the Indo-Burma Connection Survey. In October, 1915, Mr. Bell joined the Indian Army Reserve of Officers and was on active service in Mesopotania from 1916-19. There he established a great reputation as the builder of numerous pile and girder bridges over important waterways, including the Euphrates. Upon demobilisation in September, 1919, he was placed on special duty with the Railway Board, which included his being sent on deputation to England and other countries for about a year. After a period as Assistant Secretary and of further special duty with the Railway Board, (1920-22), his services were lent in the latter year to the Bengal-Nagpur Railway, as District Engineer on the Barkakana-Chandil construction, until 1926. In 1927, Mr. Bell was transferred to the East Indian Railway, as District Engineer, Dhanbad. During 1928-29 he was appointed Superintendent of Works in charge of the Central India Coalfields Railway and in the latter year was appointed to officiate as Divisional Superintendent, being confirmed in that rank in 1931. In January, 1933, he was appointed a member of the Pope Economy Committee, and, upon the termination of its work, he became Deputy Agent (Organisation) of the East Indian Railway, a post he held until he went on leave in October, 1934. On return from leave Mr. Ball took over charge as Agent on October 16 last.

Mr. J. A. Bell, M.B.E.,
Appointed to officiate as Agent of the East Indian Railway

We regret to record the death, on November 9, of Mr. Elias Ford, O.B.E., M.Inst.T., late Chief Goods Manager, G.W.R. Mr. Ford was born in 1870, and on leaving school joined the railway and was attached to the newly-created running department of the Divisional Superintendent's office at Plymouth. After six years' experience of working on lines west of Exeter, he was, at his own request, transferred to the Chief Goods Manager's Office at Paddington in 1890, his duties there dealing with matters in connection with the conversion from broad to standard gauge. In 1895 he was transferred to the new works and Parliamentary sections of the General Manager's office, and in 1905 was appointed Chief Clerk to the District Goods Manager at Worcester. Sixteen months later Mr. Ford was transferred to the Cardiff District office, where he remained for 11½ years, during which he became first Assistant District Goods Manager, and in 1914 Manager. He returned to London as Assistant Chief Goods Manager in 1918, and succeeded Mr. C. A. Roberts as Deputy Chief Goods Manager, when he retired. It was in 1924 that Mr. Ford became Chief Goods Manager, the appointment from which he retired in the spring of 1931. He was Chairman of the Goods Managers' Conference in 1926, was a foundation member of the Institute of Transport and an ex-member of Council.

AN APPRECIATION BY AN OLD COLLEAGUE

With the passing of Mr. Ford we lose yet one more of those outstanding

men who have left their mark on the Great Western Railway; one who possessed to an unusual degree the power to look into the future and, more unusual still, the courage to act on what he saw there. In times of depression and falling revenues this courage enabled him to press forward schemes of great magnitude and great cost, schemes which sometimes appeared to some of his subordinates difficult of justification, but which have even now shown that his faith in them

The late Mr. E. Ford, O.B.E.,
Chief Goods Manager, G.W.R., 1924-31

was fully justified: in the years to come it will be found that they were essential to the wellbeing of his company.

His years of service teemed with tasks for such a man. Problems with which he came into contact included that of the conversion of the gauge, those of the war years, revision of wages and conditions of service, the amalgamations and revision of rates and charges consequent on the Act of 1921, the advent of road competition and the heavy slump in world trade. To all these he brought to bear an outlook far seeing and effective: bold at times to the point of wonderment, but his decisions have withstood the test of time and stand to-day a testimony to the mind and strength which gave them birth.

And what of the man? He was compounded of a strange mixture which became evident only on close acquaintance. To the leonine courage already mentioned was allied a shyness of strangers which verged on the painful, a retiring disposition; a warm heart for other people's troubles, and a desire to do good by stealth—a strange blend but one which endeared him to those who got below the surface, yet one which sometimes, in an effort to overcome his shyness, induced a frigidity in his dealings with strangers which he was afterwards always the first to deplore.

Full of charitable feeling he interpreted literally the Scriptural injunction to give a tithe, and numerous will be they who have cause to regret his demise. An uncanny memory which at times saved hours of research and at others startled men who, with the effluxion of time, had allowed an instruction to drop out of their scheme of things, constituted his almost sole vanity.

His justice—no stony officialdom but born of fellow feeling, sympathetic understanding and love of his kind: his kindness of heart—of which many can tell: his keen sense of humour, which enlightened many a profound discussion: and his deep interest in the welfare, both material and educational, of those in his care: these were some of his virtues. He made no claim to be a social man, but friends gladly received him where ere he went.

Such was Mr. Ford; a great railwayman, a great father and a great friend to those who knew him. His name is carved deeply in the annals of the company he honourably served and in the hearts of those who were privileged to work with him.

Attendance at Funeral

Among those who formed the large congregation at the funeral service at St. Peter's, Ealing, were:—

Mrs. Ford (widow); Mr. Leslie E. Ford, Docks Manager, Port Talbot, G.W.R., and Mr. J. Ford (sons); Mr. and Mrs. Hiscock. Also Messrs. C. L. Amphlett; J. F. Anstey (representing Mr. J. H. Parker, D.T.M. Plymouth, G.W.R.); J. F. Bradford (also representing Retired Railway Officers' Society); A. Bond; C. Bassage, late Principal Assistant to Ch. Goods Manager, G.W.R.; C. W. Ballinger; L. R Burleigh Bruhl (representing Sir Felix J. C. Pole); F. A. Cartwright (representing Mr. W. H. Hall, D.G.M. Shrewsbury, G.W.R.); Mr. and Mrs. E. A. Clear; Messrs. C. J. Challenger, D.G.M. Exeter, G.W.R.; E. C. Cox, C.B.E., M.V.O., Traffic Manager, S.R.; H. E. Cracknell, D.G.M. Cardiff, G.W.R.; S. O. Carter, Powell Duffryn Steam Coal Company; R. Cope, Chief Accountant, G.W.R.; P. E. Culverhouse, Architect, G.W.R.; H. W. Carter; F. C. A. Coventry, O.B.E., Supt. of Road Transport, G.W.R.; C. Coe; E. W. Chilcot; E. F. Davies (representing Mr. R. Carpmael, Chief Engineer, G.W.R.); W. E. Davies; C. Furber, Mineral Traffic Manager, G.W.R.; E. A. Gardiner; J. F. Gee, Chief Accountant, L.M.S.R.; A. Winter-Gray, Secretary, Institute of Transport; J. C. Griffiths, J. Lyons & Co.; S. E. Hoople (representing Messrs. M. F. Barnard and A. Brown); Mr. A. B. Holloway, M.B.E., late D.G.M. Reading, G.W.R.; Mrs. Holloway; Messrs. W. H. Hyde, late General Manager, G.E.R.; F. C. Hockridge (representing Mr. F. W. Showers, Surveyor and Estate Agent, G.W.R.); W. A. Jepson, late Asst. General Manager, L.M.S.R.; Mrs. Jepson; Messrs. W. E. James, late D.G.M. Swansea, G.W.R.; A. H. Jeffries; F. W. Lampitt, Commercial Assistant to Ch. Goods Manager, G.W.R.; J. F. Lean (representing Chairman and Directors, G.W.R.); H. G. Lees; W. W. Legg, Assistant Editor, The Railway Gazette (also representing Mr. J. A. Kay); G. Ling; J. W. Lovejoy, late D.G.M. London, G.W.R.; R. Lyttelton (representing Guest, Keen & Nettlefolds Limited and Baldwins Limited); H. S. Lanning; H. C. Law, late D.G.M. Reading, G.W.R.; A. Maynard, Chief Goods Manager, G.W.R. (also representing Sir James Milne, General Manager); H. E. Machin (representing Mr. E. E. Painter, Secretary, Railway Clearing House); E. W. Mauger, D.G.M. Worcester, G.W.R.; F. B. Mortimore; A. S. Mills, D.G.M. London, G.W.R.; Mrs. Mills; Mrs. J. P. Monkhouse; Messrs. T. Martin, District Goods Manager, Liverpool, G.W.R.; R. H. Nicholls, late Supt. of the Line, G.W.R.; A. G. W. Parsons; J. Pike; F. K. Pelley, D.G.M. Birmingham, G.W.R.; A. H. Philpot, C. Shaw, Lovell & Sons Ltd.; W. Powell, late D.G.M. Newport, G.W.R.; C. A. Roberts, late Chief Goods Manager, G.W.R.; C. A. E. Smallbone; F. Smith (also representing Mr. Clement Davies, K.C., M.P.); Sir Montagu Sharpe, K.C., D.L., C.A.; Messrs. J. A. Swift; A. J. Smith; C. O. L. Sim; W. J. Thomas (also representing Mr. C. S. Page, Chief Docks Manager, G.W.R.); F. W. Tyler, late D.G.M. Bristol, G.W.R.; H. M. K. Veltom; F. S. Veltom, D.T.M. Ireland, G.W.R.; H. C. Walton, Railway Benevolent Institution; H. B. Webster (also representing Mr. Ashton Davies, Ch. Commercial Manager, L.M.S.R., and Mr. T. E. Argile);

Mr. F. H. Graveson,
Assistant to the Divisional General Manager, North Eastern Area, L.N.E.R., 1923-35

O. J. White, late Mineral Traffic Manager, G.W.R.; J. M. Wildsmith, D.G.M. Newport, G.W.R.; H. L. Wilkinson, Supt. of the Line, G.W.R.; S. Witherington (also representing Mr. A. G. Hubbard, Solicitor, G.W.R.); G. J. Walker, Manager, Hotels and Refreshment Rooms Dept., G.W.R.

Mr. F. H. Graveson, who, as announced in our issue of November 8, has just retired from the position of Assistant to the Divisional General Manager, North Eastern Area, L.N.E.R., joined the North Eastern Railway in 1894 as a clerk in the trains department of the Superintendent of the Line. In the following year he was transferred to the newly formed Advertising Department and three or four years later took up staff and statistical work and was in charge of the staff section of the Superintendent's office at the time of the reorganisation of the railway in 1902. Towards the end of that year, at the request of Sir George Gibb, he took up special work in connection with operating costs. In 1909 he took charge of Parliamentary and Railway Commission cases, together with the supervision of Statistics of Operation in the General Manager's office. In 1918 Mr. Graveson accompanied Sir Guy Granet on a special mission to the United States and acted as Director of Statistics in the British Ministry of Food there. He returned to the North Eastern Railway

at the beginning of 1919 and in 1922 was appointed Assistant to the General Manager, with charge of the Traffic Statistics office. After the general railway amalgamation he continued to hold the corresponding office under the Divisional General Manager, North Eastern Area, L.N.E.R., and it is from this that he now retires.

PRESENTATIONS TO MR. F. H. GRAVESON

On Tuesday, November 5, Mr. F. H. Graveson, Assistant to the Divisional General Manager, North Eastern Area, L.N.E.R., was presented, on behalf of the Railway Statistics Committee, with a pair of binoculars and a fountain pen, to mark the occasion of his severance from the committee owing to his impending retirement. The presentation was made by Mr. W. V. Wood, Vice-President, L.M.S.R., Chairman of the committee, who was supported by Sir James Milne, General Manager of the G.W.R., Mr. A. E. Kirkus, Director (Statistics) of the Ministry of Transport, Finance & Statistics Department, and the members of the committee.

In making the presentation Mr. Wood recalled that Mr. Graveson had been a member of the Statistics Committee for the past 16 years, namely, since its inception, during which time he had given unstintedly of his extensive knowledge and ability in the work of establishing and revising the general railway statistics. Tributes were also paid by others present to the large part he had taken in work of this character. Mr. Wood, on behalf of the committee, then asked Mr. Graveson to accept the gifts as a token of esteem and regard from his fellow members on the committee.

In thanking the chairman for these gifts, Mr. Graveson stated that his long association with the committee had, he hoped, not only been to good purpose on account of the work done by the committee, but had also been for him a very happy period, and he took this opportunity of offering his sincere and hearty thanks to all the members present for the harmonious manner in which the business of the committee had always been conducted, and especially for the great kindness and friendship that had been extended to him personally by all its members.

On November 11 at the headquarters offices, York, Mr. F. H. Graveson, who on that day retired from the position of Assistant to the Divisional General Manager, North Eastern Area, received a present from the office staff. Mr. Thomas Hornsby, Divisional General Manager, who presided, handed over the gift (a special type of camera) and bade Mr. Graveson "an affectionate goodbye." Among the many others who spoke were Mr. W. W. Masser and Mr. F. Parkinson.

On the same day, November 11, Mr. Graveson was also entertained at lunch at the Royal Station Hotel, York, by present and retired officers, who presented him with a unique gift in the shape of a solid silver replica of the "Winchester bushel," measuring 12 in. in diameter and 6 in. in depth, and bearing the inscription HENRICUS CEPTIMUS DEI GRATIA REX DANGLE ET FRANCIE. The original "Winchester bushel" was made by King Edgar who reigned from the year 958 to 975. During the reign of King Henry VII from 1485 to 1509, it was discovered that the bushel measures in various parts of the country were not of one standard, and the Winchester bushel was declared by Henry VII to be the standard measure. A beautiful opal brooch was also presented to Mrs. Graveson.

The Port of London Authority has co-opted Mr. A. K. Graham on to the board to fill the vacancy caused by the death of Mr. C. S. S. Guthrie. Mr. Graham is a Director of Dalgety & Co. Ltd., Grahams Trading Co. Ltd., Union Assurance Society Limited, and other concerns.

INDIAN RAILWAY STAFF CHANGES

Mr. R. Bonar has been appointed to officiate as Divisional Superintendent, Mechanical, E.I.R., as from Sept. 13.

Mr. F. E. R. Laborda has been appointed to officiate as Chief Medical Officer, E.I.R., as from September 23.

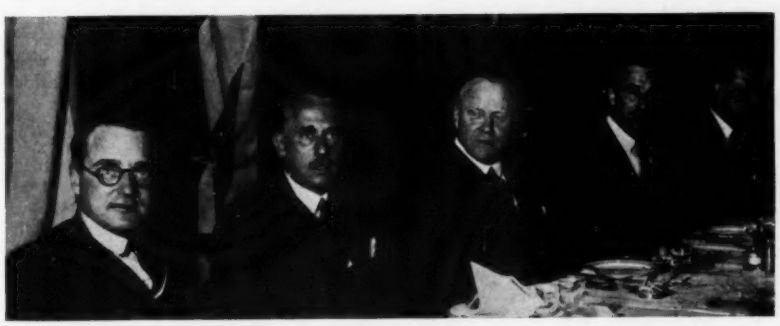
Mr. R. S. Vipan, Deputy Traffic Manager (Commercial) A.B.R., returned from leave on September 15 and assumed charge of his duties from Mr. V. L. Thompson, who became Deputy Traffic Manager (Transportation) from the same date.

Dinner of the South American Centre of the Institution of Locomotive Engineers

In the Overseas columns in our issue of November 1, we briefly recorded the proceedings at the dinner of the South American Centre of the Institution of Locomotive Engineers (London), held in Buenos Aires on September 20. Subsequently, further details of the speeches and a photograph—reproduced below—of this remarkable gathering have been received from our correspondent in Argentina. It may be noted that the group illustrated includes, Mr. C. R. S. Harris, the newly-appointed Director-General of the B.A.G.S. & B.A.W. Railways; Mr. J. M. Eddy, C.B.E., a Director of those lines; Mr. Ronald Leslie, General Manager of the Central Argentine Railway; Mr. Ormond Steven, M.C., M.I.Loco.E., Chief of Operation, B.A.G.S. & B.A.W. lines, and Chairman at the dinner; and Mr. M. F. Ryan, C.B.E., General Manager of the B.A. & Pacific Railway, and founder of the Argentine Centre of the Institution of Locomotive Engineers and Past-President of the parent institution. In all, some 143 members and guests were present.

In proposing the toast of the South American Centre, Mr. Eddy congratulated it on its numbers and keenness and on the fact that of the 68 papers it had presented, no fewer than seven had received the parent institution's mention as the most meritorious of the year. Turning to transport problems generally and road competition in particular, he said, "we all believe that in the economics of every country, railway transport will always be a necessity." But continuing, he said that one thing was certain, namely, that greater operating efficiency must be attained if the industry was to prosper, and to that end he urged study, research and exchange of ideas.

Mr. E. C. Noble, replying on behalf of the Centre, said the diesel engine challenged the steam locomotive on grounds of cleanliness and suitability for shunting and for light self-contained units, but for general main line work much research and experiment was yet necessary before the reliability of the steam locomotive could be obtained with a diesel unit. He further criticised the diesel on grounds of prime cost, but agreed that the light self-contained unit had come to stay, and he was sure that there was plenty of brain in the Centre to tackle the problem and use the light vehicle to the best advantage of the railways. The gist of the other speeches has been given in the Overseas letter published on November 1.



Left to right: Messrs. C. R. S. Harris; M. F. Ryan, C.B.E.; J. M. Eddy, C.B.E.; O. Steven, M.C.; and Ronald Leslie

XUM

The G.W.R. and the £30,000,000 New Works Scheme

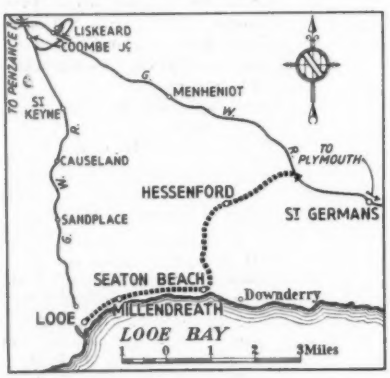
In amplification of the outline statement published last week, the G.W.R. has now issued the following particulars of the new works it proposes to carry out within the next five years under the agreement recently concluded with the Government. In many cases it will be necessary to secure Parliamentary powers for the works.

Dawlish-Newton Abbot Deviation

To facilitate traffic to and from the West of England, it is proposed to build a new double-track by-pass line 8½ miles in length, leaving the present main line at a point near Dawlish Warren and rejoining it at Newton Abbot. It will run inland passing under Haldon Down north of the existing sea coast route, and will be used for trains to and from the Torquay line, Plymouth and Cornwall, not requiring to serve Dawlish or Teignmouth. The scheme has been made necessary by the continued increase in the holiday traffic to Devon and Cornwall, and is a continuation of a series of other large schemes recently carried out for providing four lines of way through the Taunton district and at various places between Taunton and Exeter.

New Line from St. Germans to Looe

The new branch line to Looe is designed to leave the main West of England line about 1¾ miles west of St. Germans station at what is known as Trerule Foot. It will be about 7 miles long; will traverse the Hessenford Valley; and will probably have three intermediate stations at Hessenford, Seaton Beach (near Downderry) and Millendreath. A new terminus station will be built on the high ground at East Looe.



Sketch map showing approximate course of the proposed new line from St. Germans to Looe

The train service will be worked by streamlined diesel railcars to and from Plymouth, where connections will be given with the main line services. The journey between Plymouth and Looe will occupy about 35 min., representing a saving of about half-an-hour as compared with the present route.

Exeter Station

The Exeter (St. David's) station improvement scheme comprises very substantial alterations and enlargements for both passenger and goods purposes. In the passenger station a new high-level island platform, 850 ft. long, is to be built on the west side for dealing with the Southern Railway trains. The two lines serving this platform will be carried over the G.W.R. main lines at the west end of the station by means of a bridge, and from St. David's to Cowley Bridge two additional lines will be provided which will enable Southern Railway trains to and from Exeter Central to operate independently of G.W.R. trains to their mutual advantage. This will enable the three existing platforms to be available for G.W.R. trains only. These platforms are to be remodelled and lengthened, and provided with more ample covering.

The goods facilities are planned to be transferred to a site on the west side at the north end of the station where a new goods depot, warehouse, loading dock, cattle pens and marshalling and mileage yards will be provided, with access from the new bridge which, it is understood, is to be constructed by the City authorities to provide a public thoroughfare across the railway and the River Exe, linking the City with Exwick.

Penzance Station

The Penzance improvements scheme provides for the rebuilding and enlargement of the station, and the provision of new office accommodation. The two short platforms now available are unequal to meeting the requirements of the long trains arriving at and departing from the station during the summer months, and to overcome the resulting inconvenience it is intended to supersede them by four platforms 900 ft. long with ample covering. To avoid dealing with fish and flower traffic on the passenger platforms, new loading banks with covering will be provided; the whole scheme involving the construction of a new sea wall, which may be so designed as to afford an additional amenity in the form of a promenade between the town and a point beyond Chyandour. The goods offices and accommodation will be transferred to Ponsandane, where a new goods shed and warehouse will be built with the necessary offices, mileage yard and cattle pens.

Barnstaple and Minehead Branches

Under present conditions, through trains to Barnstaple or Minehead are subject to delays after leaving Taunton. These delays will be largely obviated by the improvements which it is now proposed to carry out to facilitate the working, including the doubling of the lines between Norton Fitzwarren and both Bishop's Lydeard and Milverton. In addition, platforms are to be lengthened at Morebath, East Anstey, Bishop's Nympton, Dulverton, and Filleigh stations, and the loop lines at various passing places are to be extended. These arrangements will have the effect of reducing the time occupied in passing over these branches and the resorts served by them should benefit to a substantial extent.

Newquay Station

The continued growth of holiday traffic to Newquay makes it desirable to improve the working facilities on the branch line from Par, and it is proposed to extend the loops at Roche and Luxulyan to accommodate the longer trains running to Newquay. At Newquay itself, the section of single line to Tolcarne Junction, where the Truro line joins that from Par, is to be doubled, and the bridge over the picturesque Trenance Valley widened to take two sets of lines. The station platforms are to be extended and new station buildings erected, including booking office, parcels and luggage-in-advance accommodation, also five additional sidings for the stabling of rolling stock.

Paignton Station

This scheme will result in the present accommodation at Paignton station being nearly trebled. There are to be five platforms capable of accommodating the longest trains running on the Torquay and Kingswear line. The new station buildings, booking hall, parcels office and cloak rooms will be provided on the west side with access direct from the Dartmouth Road, which will avoid the present congestion arising from the use of Torbay Road. A footbridge will connect all platforms, with lifts for parcels and luggage, and on the east side ample facilities will be afforded for dealing with passengers' luggage in advance.

A public subway is to take the place of the existing footbridge at the Torquay end of the station, and a similar subway built at the Sands Road end, where the level crossing will be dispensed with, vehicular traffic being diverted to the adjacent Roundham Road bridge which it is proposed to reconstruct. At Goodrington, capacious siding accommodation is to be given for coaches hitherto taken to and stabled at Newton Abbot, and a 65 ft. locomotive turntable constructed.

Plymouth North Road Station

The improvements at Plymouth consist of the rebuilding and enlargement of North Road station and the concentration there of the whole of the passenger traffic now dealt with at Millbay and Mutley, both of which stations will be closed for passenger train traffic. The present intention is that the four existing platforms are to

be replaced by seven of greater length and width with ample covering. The platforms will accommodate the longest trains running to and from the west of England. The whole of the present buildings will be demolished, and the main buildings to be constructed on the south side will provide commodious booking hall, offices, waiting and refreshment rooms and a new parcels depot in which the parcels traffic of the three Towns will be concentrated. The other platforms will have adequate waiting and refreshment facilities. All the platforms will be connected by separate passenger and parcels footbridges. The down platform will lead directly on to a more extensive approach affording ample space for motor cars and with the contemplated improvement of the public access, the new station should be well worthy of the city.

Plymouth Docks

At Millbay Docks the waiting, refreshment, and examination accommodation is to be remodelled and modernised, which will add materially to the comfort and convenience of passengers arriving by tender from ocean liners prior to their departure by train.

Haverfordwest

The passenger station platforms are to be raised to the usual height and some alteration made in the station offices. The contemplated improvement in the accommodation for goods traffic, however, is substantial and includes a new shed, additional mileage accommodation and cattle pens.

Improvements at Swansea

The arrangements for the satisfactory co-ordination of the goods business of the two railway companies at Swansea (G.W.R. and L.M.S.R.) necessitates the concentration of the clerical staff at the G.W.R. depot at High Street, and, in order to accommodate this large staff, a new block of offices is to be erected adjacent to the present offices.

Porthcawl Branch

Some years ago the G.W.R. contemplated doubling the Porthcawl branch from Pyle to its terminus, but mainly for financial reasons this improvement ended at Cornelly, the remainder of the line—about 2½ miles—continuing as a single line. Developments at Porthcawl, and the increasing popularity of that seaside resort have proved the capacity of the single track to be insufficient, more especially during the summer months. It is proposed to complete the doubling from Cornelly to Porthcawl and to enlarge the facilities at the station.

Whitland Works

Improvements at Whitland station include remedying the absence of protection for passengers requiring to change from main line to branch trains and vice versa. The platforms are to be lengthened and the down platform converted into an island, so that the working of the Pembroke and Tenby line trains will be expedited, and passengers for that line enabled to entrain without waiting for any prolonged period on the platform. The sidings for goods traffic are situated on both sides of the railway, and these are to be unified on the south side, which will be more convenient for traders.

Works at Pantyffynnon

The works to be undertaken comprise increasing the siding accommodation at Pantyffynnon required for dealing satisfactorily with the coal traffic emanating from the various collieries in the locality. A new loop line is also to be provided to form a link between Ammanford and Pantyffynnon.

Llanelly Station

Any comprehensive scheme of improvements at Llanelly station depends primarily upon some arrangement being possible for the elimination of the level crossing at each end of the station. This has been the main obstacle to any scheme within reasonable limits for many years, and unfortunately the same difficulty continues. If a solution of that difficulty is forthcoming by the substitution of a road bridge, as has been suggested on several occasions, the company has expressed its willingness to carry out a scheme of reconstruction under the financial arrangement now possible with the Treasury. The recent decision of the Council to rescind its resolution of a few years ago objecting to the abolition of the level crossings has opened the door to fresh consideration of the matter by the company, and alternative schemes have been devised, one for the reconstruction of the station on its present site with additional platforms and new and commodious buildings, and the other for a new station on a site further west. In either case level crossings would have to be replaced by bridges and property acquired, and the promise of the company depends upon the co-operation of the Council in that respect.

A.T.C. to be Extended

At present automatic train control has been installed on 2,130 miles of the company's main line routes between Paddington, Plymouth, Swansea, and Wolverhampton. It is now to be extended along the three main lines to Penzance, Fishguard, and Saltney, near Chester, and also from Shrewsbury to Hereford. The extension means the equipment of an additional 520 miles of track and of 68 engines with the necessary apparatus.

Southern Railway Musical Society

The Southern Railway Musical Society presented "The Country Girl" at the Fortune Theatre, Drury Lane, from November 6 to 9. Under the production and musical direction of Mr. George Hay, the society took full advantage of the humorous and spectacular possibilities of the piece, the chorus work and concerted numbers being excellently arranged and most smoothly carried out considering the comparative smallness of the stage.

The principal parts were taken by Mr. S. A. Staplehurst (Geoffrey Challoner); Mr. A. C. Stafford (the Rajah of Bhong); Mr. T. E. Newman (Sir Joseph Verity); Mr. H. J. Davison (Douglas Verity); Mr. A. W. Baldwin (Barry); Mr. W. F. Young (Lord Anchester); Miss Winifred Kempson (Marjorie Joy); Miss Marie Woods (Princess Mehelaneh of Bhong); Miss Marjorie Bowen-Walters (Madam Sophie); Miss Eveline Swales (Mrs. Quinton Raikes); Miss Josephine Romang (Lady Anchester); and Miss Doris James (Nan). Inspired by the fact that the play hinges upon an election, various topical allusions were cleverly worked into the dialogue while the Rajah's final song "Peace! Peace!" was successfully modernised by Mr. David Graves.

Among the audience at the guest night on Friday were:—

Sir James Milne, General Manager, G.W.R., and Lady Milne; Mr. W. V. Wood, Vice-President, L.M.S.R., and Mrs. Wood; Mr. G. C. Rhodes, French Line; Mr. W. Gourlay, American Express Company; Mr. W. J. Elliott, General Manager, Pickfords Limited; Mr. H. G. Dring, Canadian Pacific Railway; Mr. G. H. Griffith, Pullman Car Co. Ltd.

Southern Railway.—Sir Charles L. Morgan, Director; Mr. Edwin C. Cox, Traffic Manager, and Mrs. Cox; Mr. G. Ellson, Chief Engineer, and Mrs. Ellson; Mr. C. Cooper, Assistant for Continental Traffic; Mr. R. G. Davidson and Mr. A. Howie, Joint Accountants; Mr. R. M. T. Richards, Development Officer; Mr. H. E. O. Wheeler; Mr. F. V. Milton; Mr. A. E. Hammett; and many others.

CAMBRIDGE UNIVERSITY RAILWAY CLUB.—This club has been formed recently at Cambridge to stimulate the interest of undergraduates in railway matters, and, from the support it is already receiving, it is anticipated that its objects will be achieved. The President of the Club is Mr. John Bonham Carter of King's College, whose own model railway at his home at Acton was recently described in the daily press. A series of lectures and visits to railway centres have been arranged to take place this term, and on October 21 the club was given a lantern lecture on "Whitemoor Marshalling Yard," by Mr. H. F. Sanderson, District Superintendent, L.N.E.R., Cambridge, who is Patron of the club. This was followed by a visit to Whitemoor. The social side is not being neglected and an original feature is the design and production of a club tie, which has a background of light blue with stripes of the colours of the four main line companies—L.N.E.R. green (which comes first in honour of that company being the "home" company); another tone in green to represent the Southern; red for the L.M.S.R. and cream for the G.W.R.

XUM

RAILWAY AND OTHER MEETINGS

Argentine Great Western Railway Co. Ltd.

The ordinary general meeting of the Argentine Great Western Railway Co. Ltd. was held at Winchester House, Old Broad Street, E.C., on November 12, the Rt. Hon. Viscount St. Davids (Chairman of the company) presiding.

The Secretary (Mr. J. T. Dillon) read the notice convening the meeting and the auditors' report.

The Chairman, in moving the adoption of the report and the accounts, said the shareholders had all been sent a full report of the Chairman's speech at the Buenos Ayres & Pacific Railway meeting, which gave the general position of the property. As far as this railway was concerned, he was sorry to say that the passenger traffic had continued to decrease. Competition on the roads was very severe, and in the Argentine Great Western district it was easier to make roads than in most other parts of Argentina, because there was plenty of stone in the district. They were doing their very best to recover some of this lost passenger traffic.

On this system the goods traffic had increased; wine traffic increased by 62,000 tons. The authorities were taking measures to restrict the overproduction of wine and ensure better quality. In this company's district there were over 300,000 acres of vineyards and 40,000 acres of fruit trees. That was much bigger than it sounded, because all of it was irrigated land. The export of fruit abroad continued to increase. During last year about 10,000 tons of fresh fruit from this company's district were exported. The countries receiving the fruit were mainly the United States, Brazil and Great Britain. A fresh trade agreement had been made between Argentina and Brazil, which was likely to lead to big developments in fruit export, because Argentina needed Brazilian oranges and Brazil needed the fruit that Argentina produced. Unfortunately, the export of fruit to Great Britain had been badly hit by the British Colonial agreements, under which tariffs had been put on to favour British colonies, and those tariffs greatly favoured South African fruit. In this company's district there had been a great increase in the production of dried fruit, and they had had an increase in the amount carried of 4,500 tons, or 50 per cent.

The Argentine Transandine Railway, in the work of which this company was greatly interested, had been closed for traffic throughout the year, except a very short portion of it, following a a bad flood over a year ago.

He must allude again to the Government competition with this company's line. He spoke out very plainly at the Pacific meeting, and he did not think he ought to miss another opportunity of saying what he was sure they all thought about it. It affected this railway first of all, and the Pacific only secondly. The Argentine Great Western Railway was built by the Argentine Government; it was sold by the Argentine Government to this company; and now the Argentine Government was building a line from San Juan to Mendoza to parallel the railway it itself built and it itself sold. This Government line was not being built to develop traffic. Except on a very small bit of land near San Juan capable of irrigation there was no possible traffic on this new line that could ever be developed. The land was desert and could not be irrigated, as it lay too high. This line was being built through a waterless desert in order to compete with this company and for no other possible purpose. No other Argentine Government would ever have done such a thing. It was an entirely new policy on the part of this particular Government, which was undoubtedly creating a bad atmosphere in Great Britain for Argentine affairs.

On behalf of the stockholders he thanked the stockholders' committee for its work in connection with their affairs, and also thanked the local board in Argentina, the manager and the staff for their good work and attention in these difficult times. He hoped it would not be too many months before further payments on the back coupons of 2nd debenture interest could be announced.

The report and accounts were unanimously adopted, and a vote of thanks to the Chairman, directors, officers and staff concluded the proceedings.

Bengal Dooars Railway Co. Ltd.

The 45th ordinary general meeting of the Bengal Dooars Railway Co. Ltd., was held on Tuesday, November 12, 1935, at the offices of the company, Gresham House, Old Broad Street, E.C.2, Sir Henry P. Burt, K.C.I.E., C.B.E. (Chairman of the company) presiding.

The Secretary (Mr. F. J. Horne) read the notice convening the meeting and the auditors' report.

Before proceeding with the business, the Chairman announced that Mr. R. Langford James, one of their directors, was on his way to India, and therefore, unable to be present. While in India, he proposed visiting their railway, when he would discuss the various subjects to which he was about to refer with Mr. J. A. Polwhele, their manager.

With the concurrence of the meeting, he proposed to adopt the usual practice of taking as read the directors' report and accounts for the year ended March 31, 1935, copies of which had been posted to each stockholder. From these they would have seen that the results for the year showed a small increase in the net earnings, which in view of the prevailing depressed conditions, might be considered as not unsatisfactory.

There had been no outstanding features, physical or financial, which called for special mention in connection with the company's activities, but he was pleased to be able to report that the railway had sustained no damage from floods during the year under review, and that during the current year, notwithstanding a rather alarming change of direction in the main stream of the Teesta River in the vicinity of Barnes Ghat during July and August (which at the time caused the directors some anxiety) their protective works withstood the strain and no damage of moment had been done. Nevertheless, it would be necessary, before the next monsoon season, to strengthen the existing works, and it might also be necessary to construct further protective works in that area.

By reference to the report they would see that the coaching traffic receipts were about Rs. 7,000 below those of the previous year, being Rs. 3.90 lakhs against Rs. 3.97 lakhs. This small decrease was, however, offset by an increase of about Rs. 56,000 in goods receipts which were Rs. 16.16 lakhs as compared with Rs. 15.60 lakhs.

The restrictions on the export of tea had again further reduced the tonnage carried over their lines, receipts from that commodity showing a reduction of some Rs. 16,000. There were also decreases in the carriage of manures of Rs. 10,000 and jute Rs. 7,500. The principal increase from the carriage of goods was in fuel Rs. 12,000, tobacco Rs. 16,500, mineral substances and metals Rs. 20,500, and from all other articles of general merchandise, too numerous to enumerate, Rs. 40,000. Ferry and miscellaneous earnings were practically unchanged being Rs. 51,000 compared with Rs. 49,500 for the previous year. In working expenses there was a small increase of about Rs. 11,000 but the percentage of gross earnings showed a decrease of 0·90, being 57·77 as compared with 58·67.

Increase in Revenue

With regard to the revenue account (No. 7) this, after making allowance for the payment of Indian income tax and super tax, showed aggregate earnings of £59,692 (an increase of £3,916 compared with the previous year), which amount, plus the balance brought into account from the previous year, gave a total of £114,365. From this must be deducted the preference stock dividend £14,400, an interim dividend on the ordinary stock absorbing £12,000, which was paid on March 28, 1935, and reserve for income tax £2,500, leaving a balance of £85,465, of which £10,000 had been

carried to reserve. This meant that they now had £75,465 to be dealt with.

From this sum the board recommended the payment of a final dividend of 4 per cent. on the ordinary stock, which would make a total distribution of 7 per cent. for the year and leave a balance of £59,465 to be carried forward against £54,673 brought in from the previous year.

Subjects of special interest as factors of far-reaching importance regarding traffic receipts, both from goods and passengers, were road motor competition, tea export restrictions, and to a certain extent, the reduction of the acreage under jute. With regard to the former, he regretted to say that competition was gradually extending, not only in the carriage of passengers, but in the transport of goods. Unfortunately, no effective enforcement of regulations for governing the running of these road vehicles had yet been brought into effect by the Government, and until this was done, railways could not hope to compete profitably with privately owned road vehicles.

This question, in all its bearings, was receiving the serious attention of the Indian Railway Conference Association; a committee appointed by that body had reported on the subject; and measures which would give the railways scope for dealing on a more equitable footing with such competition were under the consideration of the provincial governments, and would, it was hoped, be adopted. Strong representations had been made in the proper quarters urging the necessity for prompt action, and they could only await developments patiently.

The restriction of the export of tea was regulated by legislation passed in 1933, and extended over a period of five years from April 1, 1933. The scheme was international, India, Ceylon, and the Dutch East Indies having combined to regulate shipments. It was difficult to say exactly what this restriction meant to them, but roughly, it might be said that this year their tea traffic would be 25 to 30 per cent. below normal. As tea was one of the principal commodities carried over their lines, they must, until the restrictions were removed, necessarily suffer a substantial decrease in earnings from that source, and also, from a correspondingly smaller quantity of tea chests and other stores being carried for the tea gardens.

Decrease in Traffic Returns

Traffic returns for the current year had been adversely affected by the prevailing depression, and might, to a certain extent, be considered as reflecting the reaction of the problems already mentioned. Up till October 10, returns showed a decrease of approximately Rs. 1.34 lakhs by comparison with the corresponding period of last year.

In conclusion, the Chairman referred to the most excellent manner in which members of their staff in India, both European and Indian, had carried out their respective duties, upon some occasions under very trying circumstances; and to the efficiency with which the work of the London staff had been conducted. To all of these they owed their thanks. He moved:—

"That the report of the directors and the audited statement of accounts for the year ended March 31, 1935, now presented, be and they are hereby approved, confirmed and adopted."

Sir A. Kay Muir seconded, and as no questions were forthcoming, the resolution was put to the meeting and unanimously adopted.

The Chairman then moved:—

"That a final dividend of 4 per cent. on the ordinary stock of the company for the year ended March 31, 1935, subject to income tax, making, with the interim dividend of 3 per cent. paid on March 28, 1935, a distribution of 7 per cent. for the year, be and it is hereby declared to be paid to the holders of ordinary stock standing on the registers of the company on October 30, 1935, and that warrants for the dividend be issued on November 13, 1935."

The resolution, seconded by Mr. G. Anson Bayley, was carried, after which the Chairman moved the re-election of Mr. James Alexander Tassie, the director retiring by rotation.

Sir Kay Muir seconded the resolution, which was carried unanimously.

Mr. F. J. Horne, then moved that Messrs. W. A. Browne & Co. be elected as auditors of the company for the ensuing year at a remuneration of 70 guineas. Mr. J. A. Tassie seconded, and the resolution was agreed to.

A hearty vote of thanks to the company's agents in Calcutta, and to the manager and his staff in India was proposed by the Chairman, seconded by Mr. G. Anson Bayley, and carried with acclamation.

The meeting closed with a vote of thanks to the Chairman.

Railway Convalescent Homes Family Dinner

Some 397 guests attended the family dinner of the Railway Convalescent Homes, which was held on Saturday last at the Wharncliffe Rooms, Hotel Great Central, Marylebone. The chair was taken by Lord Palmer, Deputy Chairman of the G.W.R., in the unavoidable absence of Sir Robert Horne. Among those present were:—

Messrs. R. Holland-Martin, Hubert Bailey, John Cliff, R. Carpmael, Ralph Cope, G. Ellson, E. C. Cox, S. G. Rowe, W. E. C. Lazenby, J. F. Lean, John Bromley, John C. Mitchell, J. B. L. Lindsay, H. S. Chapman, E. Stone, H. E. O. Wheeler, C. A. G. Linton, A. L. Crewe, Ernest Evans, F. H. D. Page, R. R. Pettit, A. C. Cookson, K. J. Cook, C. K. Bird, T. Smith, H. Ireland, W. W. Sharp, W. Challis, W. Every, S. Madden, A. Hubble, J. Cloke, H. Bromley, W. Rolfe, E. E. Terry, J. E. Randall, A. Buswell, E. Lees, W. Jenkinson, H. Read, A. Tapster, E. Glayzer, J. Williams, W. Forsey, and W. Mepstead.

Members of the Board of Trustees included:—

Messrs. F. W. Wheddon (Chairman), W. F. Smith (Deputy Chairman), F. C. Holder (L.N.E.R.), R. W. J. Canham (S.R.), R. E. Lyon (L.M.S.R.), Percy Randall (Railway Clearing House), F. T. Roach (S.R.), G. H. Taylor (G.W.R.), and J. Whyte (L.M.S.R.), together with Mr. H. Haigh, Secretary.

Sir William Forbes proposed the toast of "The Railway Convalescent Homes," and said he well remembered the inception of the first home. His old friends and colleagues, Messrs. John Nicholls (then Cashier of the L.C.D.R.), Culver, and Tyrell, went to see him when he had left the L.C.D.R., and become General Manager of the L.B.S.C.R. They said they had secured the help of the great philanthropist, Passmore Edwards, and asked his (Sir William's) co-operation; to this he gladly agreed, subject only to the condition that the movement was not to be affected by social, political, or other influences. Sir William added that from the original home at Herne Bay, opened in 1901 during the year in which he was first President, the institution had now grown to possess eight magnificent homes. This was entirely the result of the railwaymen's own exertions; no outside help was required, and the income was now about £40,000 per annum, against an expenditure of approximately £39,000. The other side of the picture was that only 40 per cent. of railway workers were members, and if the movement was to go forward the others must be brought in and persuaded to pay the modest weekly subscription of ½d., which after all amounted in the year only to the price of three pints of beer. Sir William recalled that it was very nearly 100 years since his family connection with railways began, for it was in 1838 that his uncle, James Staats Forbes, entered the service of the G.W.R.

In responding Lord Palmer said he regarded Sir William Forbes as the father of the Convalescent Homes, who as such was able to speak with authority, knowledge, and experience. It was a tribute to the Trustees that their income was steady, and in this they were very lucky. The cost of the new games room at Dawlish (opened by Sir Robert Horne earlier in the year) with other alterations was about £5,000, and this was all met out of income. Improvements at Par were now in contemplation, namely the provision of a rest room and sun lounge. Among the four main-line railways the G.W.R. was the only one to record an increasing membership of the R.C.H.

During the evening the Chairman presented vellums of appreciation to Messrs. C. J. Morrell, G. Rolinson, and W. Underwood, who recently retired from the General Committee of the Institution. Mr. T. R. Hughes, who has also retired, was unable to be present to receive his vellum.

XUM

NOTES AND NEWS

S.R. Excursions.—The total of Southern Railway excursion tickets (day and half-day) issued during 1934 was 86,560,000.

Runemede Renamed.—The Great Western Railway announces that Runemede halt on the Staines branch is to be renamed Yeoveney.

Dutch Streamlined Steam Locomotive.—One of the large 4-6-0 express locomotives of the 3700 series is being streamlined.

Diesel Railway Traction.—Some aspects of the problem the railways have to face in regard to diesel traction were given by Mr. C. E. Fairburn, Electrical Engineer of the London Midland and Scottish Railway, in the course of a paper to the Institute of Transport last Monday. We refer to the paper editorially on page 815, and we hope to return to the matter in our next *Diesel Railway Traction Supplement.*

Insurance of Live Stock by Freight Train.—An experimental insurance scheme for cattle, calves, sheep and lambs, bacon pigs and porkers, and horses introduced by the railway companies last year has been renewed. Under this scheme the owners of live stock may insure their animals against death or injury during transport by goods train by the prepayment of premiums costing a few pence only. During the first 12 months 1,049,000 cattle, calves, sheep and lambs, and pigs were insured, and for the first three months of this year 400,000 animals were covered by it.

Railway Officers at the Commercial Motor Exhibition.—Sir George Beharrell, D.S.O., presided yesterday (Thursday) at a luncheon given by the Society of Motor Manufacturers and Traders at the Commercial Motor Transport Exhibition at Olympia to representatives of the British railway companies and the Furniture Warehousemen and Removers Association Mr. E. J. Lemon, Vice-President, London Midland & Scottish Railway, replied to the toast of "The Guests," proposed by the Chairman. Mr. H. V. Bishop, President, Furniture Warehousemen and Removers Association, also responded. We hope to publish a report of the speeches in our next issue.

Royal Engineers, Military Forwarding Services, Old Comrades' Association.—The seventeenth annual re-union of the Royal Engineers, Military Forwarding Services, Old Comrades' Association, was held in London, on Saturday, November 2. Following the annual meeting a re-union dinner was held, presided over by Mr. A. J. Selbie, of Glasgow. Colonel Goddard responded for the guests. The Honorary Secretary, Mr. A. C. Pauling, reported that, despite the passing of years, there were still over 200 members of the association. It was decided to hold the next re-union on Saturday, November 7, 1936, in London.

Indian Tourist Traffic.—In our account last week of the lecture at India House upon Indian Railways publicity, the figure given as the value of tourist traffic to India from overseas was Rs. 7 lakhs. Mr. Bhandarkar now informs us that this figure should read Rs. 14 lakhs (£105,000) a year.

Well Water for Locomotives, L.N.E.R.—The L.N.E.R. has arranged for a shaft 30 ft. deep to be sunk near Woodford and Hinton locomotive depot, on the main line from Marylebone to Manchester, to obtain water for the 60 engines stationed there. 65,000,000 gallons of water a year are used here, and the water, which will be pumped electrically at the rate of 5,000 gall. an hour, will be of better quality than the present supply.

Flying Hamburger Service.—The second fast diesel service running in the early morning from Hamburg to Berlin announced in our issue of November 8 has proved so popular that it has been necessary to replace the diesel railcar by a steam train with more accommodation. This train is now timed to leave Hamburg at 7.17 a.m., arriving in Berlin (Lehrter station) at 9.54 a.m. A dining car is included in this train, which is equipped with wireless telephony.

Continental Railways.—The Railway Club had a well attended meeting on Friday, November 8, when Mr. W. A. Willox, a Vice-President of the Club, read a paper on "Continental Railways." Mr. Willox, referring to the outstanding differences between British and Continental railways, pointed out that while the former are run by private enterprise, those on the Continent are in most cases owned or controlled by the State. Also, on the Continent, Sunday train services are normally similar to weekday services.

Further London Transport Trolleybus Routes.—On Sunday last the inauguration of trolleybus services to replace trams from Woolwich via Abbey Wood, Belvedere, Erith, and Barnehurst to Bexley heath—a distance of 8¼ miles—was marked by a special visit of officers of the L.P.T.B. and representatives of the press. A fleet of 38 trolleybuses, each seating 60 passengers, will operate the services. The bodies of these vehicles, which are notable for their silent running, were built by Brush Electrical Engineering Co. Ltd. on chassis made by Leyland Motors Limited, with electrical equipment supplied by Metropolitan-Vickers Electrical Co. Ltd. To cater for these new trolleybus services, a new depot, the first to be built specially for trolleybus operation in Greater London, has been erected on the Erith Road. With a floor space of 36,670 sq. ft., the depot has accommodation for 60 vehicles. A further conversion from trams to trolleybuses will take place on the Woolwich-Plumstead - Welling - Bexleyheath-Dartford route on November 24, and it is hoped to introduce trolleybuses between Sutton, Croydon, and Crystal Palace at the end of December.

Baldwins Limited New Addresses.—As from November 16, the registered and head office of Baldwins Limited will be P.O. Box 255, Shell-Mex House, Victoria Embankment, W.C.2 (Telephone: Temple Bar 4433, seven lines; telegrams: Balwinza, Rand, London; cables: Balwinza, London). The London Sales Office address will be P.O. 286 at Shell-Mex House, and will have the same telephone number (telegrams: Promptitude, Rand, London; cables: Promptitude, London).

Fatal Derailment of a Colliers' Train.—As a train, conveying between 40 and 50 miners, was proceeding, on Thursday, November 7, from Talywain to Blaenserchan Colliery, Monmouthshire, the rear coach was derailed at some points. One of the men jumped out, but was caught by the vehicle as it toppled over on to its side and was killed. As this train was presumably travelling on the private line of a colliery company, it was not a railway accident in the general acceptance of that term.

Streamlined Trains for the C.P.R.—The Canadian Pacific Railway has ordered from the Montreal Locomotive Works five streamlined 4-4-4 type locomotives to be used with special lightweight trains. The new locomotives will have a maximum speed of 110 m.p.h. and will be used on the Montreal-Quebec line. The principal dimensions of the engines are: cylinders, 16¾ in. by 28 in.; driving wheels, 6 ft. 8 in. diameter; boiler pressure, 300 lb. per sq. in.; weight of engine, 111 tons (English) of which 54 tons are on the coupled wheels, weight of tender, 80 tons.

The West Sussex Railway.—Under the heading "Sales by Tender," the following notice appeared in *The Times* of November 7:—"The Hundred of Manhood and Selsey Tramways Co. Ltd. To be Sold by Tender, pursuant to an Order of the Chancery Division of the High Court of Justice dated February 7, 1934, made in the matter of The Hundred of Manhood and Selsey Tramways Co. Ltd., Stephens *v.* the Company (1931 H. 1604), the Freehold Lands, situate between Chichester and Selsey, in the County of Sussex, comprising the permanent way, with six cottages and valuable sites at Chichester and Selsey and all surplus lands, rolling stock, plant, machinery, and effects of the defendant company. Tenders are to be sent to Master Willmott, Room 237, Royal Courts of Justice, Strand, London, W.C.2, not later than Thursday, December 12, 1935." Particulars and conditions of sale may be obtained from Messrs. George Thatcher and Son, 32, Essex Street, Strand, W.C.2.

XUM

British and Irish Traffic Returns

GREAT BRITAIN	Totals for 45th Week			Totals to Date		
	1935	1934	Inc. or Dec.	1935	1934	Inc. or Dec.
	£	£	£	£	£	£
L.M.S.R. (6,925¼ mls.)						
Passenger-train traffic...	385,000	383,000	+ 2,000	22,062,000	21,667,000	+ 395,000
Merchandise, &c. ...	489,000	474,000	+ 15,000	20,230,000	20,067,000	+ 163,000
Coal and coke ...	269,000	262,000	+ 7,000	10,250,000	10,152,000	+ 98,000
Goods-train traffic ...	758,000	736,000	+ 22,000	30,480,000	30,219,000	+ 261,000
Total receipts	1,143,000	1,119,000	+ 24,000	52,542,000	51,886,000	+ 656,000
L.N.E.R. (6,336 mls.)						
Passenger-train traffic...	264,000	258,000	+ 6,000	14,393,000	14,086,000	+ 307,000
Merchandise, &c. ...	342,000	350,000	− 8,000	14,059,000	14,118,000	− 59,000
Coal and coke ...	258,000	244,000	+ 14,000	9,996,000	10,159,000	− 163,000
Goods-train traffic ...	600,000	594,000	+ 6,000	24,055,000	24,277,000	− 222,000
Total receipts	864,000	852,000	+ 12,000	38,448,000	38,363,000	+ 85,000
G.W.R. (3,749¼ mls.)						
Passenger-train traffic...	162,000	164,000	− 2,000	9,348,000	9,212,000	+ 136,000
Merchandise, &c. ...	192,000	185,000	+ 7,000	8,173,000	8,092,000	+ 81,000
Coal and coke ...	117,000	104,000	+ 13,000	4,432,000	4,468,000	− 36,000
Goods-train traffic ...	309,000	289,000	+ 20,000	12,605,000	12,560,000	+ 45,000
Total receipts	471,000	453,000	+ 18,000	21,953,000	21,772,000	+ 181,000
S.R. (2,171 mls.)						
Passenger-train traffic...	252,000	238,000	+ 14,000	13,674,000	13,285,000	+ 389,000
Merchandise, &c. ...	59,500	63,500	− 4,000	2,758,000	2,923,000	− 165,000
Coal and coke ...	29,500	30,500	− 1,000	1,328,000	1,368,000	− 40,000
Goods-train traffic ...	89,000	94,000	− 5,000	4,086,000	4,291,000	− 205,000
Total receipts	341,000	332,000	+ 9,000	17,760,000	17,576,000	+ 184,000
Liverpool Overhead ... (6¼ mls.)	1,109	1,094	+ 15	53,253	51,337	+ 1,916
Mersey (4¼ mls.) ...	4,049	3,999	+ 50	180,987	183,188	− 2,201
*London Passenger Transport Board ...	560,500	522,300	+ 38,200	10,337,600	10,158,900	+ 178,700
IRELAND						
Belfast & C.D. pass. (80 mls.)	1,934	1,721	+ 213	116,438	115,167	+ 1,271
,, ,, goods	598	585	+ 13	22,996	23,358	− 362
,, ,, total	2,532	2,306	+ 226	139,434	138,525	+ 909
Great Northern pass. (543 mls.)	8,250	7,850	+ 400	481,500	458,100	+ 23,400
,, ,, goods	9,800	9,100	+ 700	420,250	394,650	+ 25,600
,, ,, total	18,050	16,950	+ 1,100	901,750	852,750	+ 49,000
Great Southern pass. (2,124 mls.)	18,889	19,261	− 372	1,122,482	1,094,578	+ 27,904
,, ,, goods	49,639	40,931	+ 8,708	1,585,722	1,481,781	+ 103,941
,, ,, total	68,528	60,192	+ 8,336	2,708,204	2,576,359	+ 131,845

* 19th week, the receipts for which include those undertakings not absorbed by the L.P.T.B. in the corresponding period last year; last year's figures are, however, adjusted for comparative purposes

Forthcoming Events

Nov. 15 (*Fri.*).—Institute of Transport (Leeds Graduate), at Church Inst., Albion Place, 7 p.m. "The Purchase and Control of Stores," by Mr. H. J. Martin.

Railway Students Association (Edinburgh), at Goold Hall, St. Andrew Square, 7.30 p.m. "King's Highway," by Mr. O. H. Corble.

Nov. 16 (*Sat.*).—Permanent Way Institution (Manchester-Liverpool), at Blackburn, 3 p.m. "Some Further Gas Problems," by Mr. J. Coombes.

Nov. 18 (*Mon.*).—Institute of Transport (Scottish), at Grosvenor Restaurant, Gordon Street, Glasgow, 7.15 p.m. "Whither Transport," by Mr. G. S. Vickary.

Nov. 19 (*Tues.*).—Institute of Transport (London), at Institute of Electrical Engineers, Savoy Place, W.C.2, 6 p.m. "Co-operation Between the Railway and the Trader," by Mr. G. Leedam.

Permanent Way Institution (Scottish), at Royal Technical College, George Street, Glasgow, 7.15 p.m. "Railway Bridges," by Mr. J. H. W. Gardner.

L.N.E.R. (York) Lecture and Debating Society, at Railway Institute, Queen Street, 7 p.m. *Debate:* "That Railway Companies' Methods of Advertising Achieve Their Objects." *Affirmative:* Mr. P. Can. *Negative:* Mr. W. Green.

Nov. 20–30.—International Exhibition of Inventions, at St. George's Drill Hall, Newcastle.

Nov. 20 (*Wed.*).—Diesel Engine Users' Association, at Caxton Hall, Caxton Street, S.W.1, at 3 p.m. *Informal Discussion:* "Modern Methods of Indicating High-Speed Engines."

Institute of Transport (Manchester-Liverpool Graduate), at Exchange Station Hotel, Liverpool, at 6.45 p.m. "British Railway Signalling—Past, Present and Future," by Mr. J. C. Boustead.

Institute of Transport (Metropolitan Graduate), at "Windsor Castle," Victoria, S.W.1, at 7 p.m. Annual Reunion.

Institution of Railway Signal Engineers, at Inst. of Electrical Engineers, Savoy Place, London, W.C.2, 6 p.m. Open discussion on "Standardisation of Practice and Methods," introduced by Major R. F. Morkill.

Nov. 21 (*Thurs.*).—Institution of Locomotive Engineers (Scottish), at Royal Technical College, George Street, Glasgow, 8 p.m. Presidential Address, by Mr. A. C. Carr.

G.W.R. (London) Lecture and Debating Society, at the Bank of England Society, 5 p.m. *Debate:* "That Patriotism is an Over-Rated Virtue." *Affirmative:* G.W.R. Society. *Negative:* Bank of England Society.

Manchester and District Traffic Association, at Grand Hotel, Aytoun Street, 7.15 p.m. "The Port of Liverpool," by Mr. J. McDougall.

Nov. 22 (*Fri.*).—R.O.D. Re-Union Dinner, at Trocadero Restaurant, Piccadilly Circus, S.W.1.

Institution of Mechanical Engineers, Storey's Gate, S.W.1, 6 p.m. General Meeting.

British and Irish Railways Stocks and Shares

Stocks	Highest 1934	Lowest 1934	Prices Nov. 13, 1935	Prices Rise/Fall
G.W.R.				
Cons. Ord. ...	66½	48½	48½	+1
5% Con. Prefce. ...	118	109	115½	+3
5% Red.Pref.(1950)	115	107	108½	—
4% Deb.	117	105	111	—
4½% Deb. ...	119	109	112½	—
4½% Deb. ...	129½	115¼	120½	—
5% Deb.	135	126¼	133½	—
2½% Deb.... ...	75	64	71	—
5% Rt. Charge ...	134 7/16	123¼	130½	—
5% Cons. Guar. ...	132 5/4	121 5/4	127½	—
L.M.S.R.				
Ord.	30½	19½	18	—
4% Prefce. (1923)	64¼	41	51½	+1
4% Prefce. ...	87	69½	80½	+1
5% Red.Pref.(1955)	107	92½	100½	—
4% Deb.	114 1/8	100½	107	+1½
5% Red.Deb.(1952)	118 11/16	111¼	112½	—
4% Guar.... ...	106½	96 3/4	101	+½
L.N.E.R.				
5% Pref. Ord. ...	24 3/4	13½	10	—
Def. Ord.	11½	6 7/8	5½	—
4% First Prefce....	76	59½	57	+3½
4% Second Prefce.	47	25½	20½	+½
5% Red.Pref.(1955)	94½	80	74½	+1
4% First Guar. ...	104	92	97	+1
4% Second Guar.	97 7/8	86½	87½	+1½
3% Deb.	90	74½	80	+1
4% Deb.	114	99¼	105	+½
5% Red.Deb.(1947)	117	108	109½	—
4½% Sinking Fund Red. Deb.	111¼	105¼	109	—
SOUTHERN				
Pref. Ord.... ...	90	63 1/8	82	+1
Def. Ord. ...	32 5/8	19	20	—
5% Prefce. ...	118 3/16	107½	115½	+2
5% Red.Pref.(1964)	115 3/4	107½	112½	+1
5% Guar. Prefce.	132	120 3/4	127½	—
5% Red.Guar.Pref. (1957)	119½	113	115½	—
4% Deb.... ...	116½	103¼	110	—
5% Deb.	134	124 13/16	133½	—
4% Red. Deb. 1962–67	113 11/16	105 9/16	110½	—
BELFAST & C.D.				
Ord.	6	5	8½	—
FORTH BRIDGE				
4% Deb.	110	100	105½	—
4% Guar. ...	110	100	104½	—
G. NORTHERN (IRELAND)				
Ord.	9 3/4	4 15/16	15	−1¼
G. SOUTHERN (IRELAND)				
Ord.	25	12½	33	−4
Prefce.	21½	13 15/16	43	−1½
Guar.	48	39	79¼	+1
Deb.	67	59	82	+1½
L.P.T.B.				
4½% "A" ...	126	115	120½	—
5% "A" ...	135½	124½	131½	+1
4½% "T.F.A." ...	113½	107½	109	—
5% "B" ...	131 3/4	118	127½	+1
"C"	97	73	104	+1
MERSEY				
Ord.	15¼	7	18	+2½
4% Perp. Deb. ...	93½	82½	95½	+1
3% Perp. Deb. ...	66½	61½	75	+1
3% Perp. Prefce.	54	44½	54½	—

XUM

CONTRACTS AND TENDERS

Ransomes & Rapier Limited has received orders from the Great Western Railway for four six-ton standard petrol-electric mobile cranes, from the L.N.E.R. for one exactly similar crane and from the Egyptian State Railways Administration for a further crane of the same type.

L.N.E.R. Road Vehicle Orders

The L.N.E.R. has placed orders for road vehicles as follows :—

Cranes (Dereham) Limited: 82 trailers for motor vehicles, various types; three 3-ton trailers with platform bodies; 18 5-ton trailers with platform bodies; four 5-ton trailers with H.D.S. bodies; two 6-ton trailers with platform bodies; one 10-ton trailer with platform body; 28 3-ton loading platform trailers; 40 3-ton low loading fixed sided trailers; 14 6-ton standard loading level platform trailers; and eight 6-ton standard loading level fixed sided trailers.

Scammell Lorries Limited: 19 M.H.3 mechanical horse tractors; 11 M.H.6 mechanical horse tractors; 11 trivan chassis with flat platform bodies; 27 3-ton mechanical horse tractors; nine 6-ton mechanical horse tractors; 51 3-ton low loading trailers; five 6-ton trailers; two 3-ton timber carriers; one 6-ton timber carrier and 80 sets coupling gear and sundry barrel slides; 96 sets 3-ton trailer coupling gear; four standard 6-ton cranked frame trailers; two standard 6-ton cranked frame trailers with flat platform bodies; and 22 sets 6-ton trailer coupling gear.

R. A. Dyson & Co. Ltd.: 28 low loading fixed sided trailers and fitting of coupling gear.

Vauxhall Motors Limited: Three 30-cwt. Bedford motor vehicles; six 40-cwt. Bedford motor vehicles; two 60-cwt. Bedford motor vehicles; and five 2-ton Bedford short wheelbase chassis and cabs, with vacuum reservoirs.

Unwins (York) Limited: three 20-cwt. Ford parcels vans.

Stewart & Arden Limited: Two 30-cwt. Morris parcels vans.

Truck & Tractor Appliance Co. (Manchester) Ltd.: Five 3-ton trailers with platform bodies; five 3-ton trailers (chassis only); and five sets coupling and brake control gear.

Rootes Limited: Six 3-ton Karrier Cob Junior tractors.

Morris Commercial Cars Limited: One 30-cwt. low loading motor vehicle.

Car Mart Limited: Four 10-cwt. Austin parcels vans.

Latil Industrial Vehicles Limited: One reconditioned K.T.L. Latil tractor.

John I. Thornycroft & Co. Ltd.: Three 1½-ton motor vehicles.

L.N.E.R. Locomotive Depot Improvements

The L.N.E.R. has completed plans for the improvement of the locomotive depot at Ardsley, midway between Wakefield and Leeds, where approximately 100 engines are stationed mainly for goods and coal traffic. A modern bunker-type coaling plant of 300 tons capacity is to be erected and the necessary sidings laid down for full and empty wagons feeding the plant. A hot water washing-out plant for engines is to be provided, together with a new 70-ft. turntable, two additional engine ash pits of a total length of 240 ft., and an additional water crane. Lamp room and oil store, enginemen's room and foreman's office will be included in a new building and the present gas lighting will be replaced by electric lighting.

Tarran Industries Limited has received a contract from the L.N.E.R. for the carrying out of alterations to the Royal Station Hotel at Newcastle.

The L.N.E.R. announces that plans have been completed for the renewal of 466½ miles of track during 1936. Besides new ballast, sleepers, chairs, &c., this will necessitate the purchase of 66,000 tons of British steel rails. In addition, 56 bridges are to be renewed and station buildings and warehouses are to be cleaned and painted.

The British Thomson-Houston Co. Ltd. has received a contract from the L.M.S.R. for Mazda electric lamps required over a period of 12 months.

The British Thomson-Houston Co. Ltd. has also received an order from the Mersey Railway for Mazda electric lamps required over a period of 12 months.

Kitchen & Wade Limited has received an order from the Central Argentine Railway for one vertical drilling, boring, tapping and studding machine.

Wagons for South Africa

The South African Railways & Harbours Board has placed orders for a total of 1,000 wagons. Of these, 500 wagons type ES4, 11 ft. wheelbase, 3 ft. 6 in. gauge, to carry 40,000-lb. (coal load 34,000 lb.) are to be built by German firms as follow :—

Waggonfabrik A.G.: 100 wagons.
Westdeutsche: 110 wagons.
Gustav Talbot & Co., G.m.b.H.: 90 wagons.
Orenstein & Koppel, A.G.: 100 wagons.
Gebr. Crede & Company: 50 wagons.
Wegmann & Company: 50 wagons.

The remaining 500 wagons are type DZ6, dropsided steel bogie vehicles, 3 ft. 6 in. gauge, to take loads of 84,000 lb. (coal load 72,000 lb.) and are to be manufactured in Belgium as follow :—

S. A. la Brugeois et Nicaise et Delcuve: 240 wagons of riveted design and 10 welded.
S. A. les Ateliers Metallurgiques: 250 wagons of riveted design.

D. Wickham & Co. Ltd. has received an order from the Antofagasta (Chili) & Bolivia Railway for six No. 5 petrol-driven light inspection railcars.

The Montreal Locomotive Works has received an order from the Canadian Pacific Railway for five streamlined 4-4-4 type locomotives to be used with special light weight trains.

Whitelegg & Rogers has received orders from the South African Government Railways & Harbours Board for 43 and from the Bengal-Nagpur Railway for 10 Ajax patent steam-operated firedoors for locomotives.

Tangyes Limited has received orders for a 250-ton crank press for the Egyptian State Railways, an hydraulic wheel press for Germany and a quantity of hydraulic lifting appliances for Colonial railway use.

A recent Reuters message from Tokyo received in Shanghai stated it was reliably learned that a tender had been awarded to Japan business interests by the Siamese railway authorities to supply a large quantity of rolling stock. Following the recent announcement that the South Manchuria Railway is supplying new rolling stock for the Peiping-Mukden Railway—a line financed by British capital—it would appear that British manufacturers will have to face growing competition in the Oriental market.

The Madrid, Zaragossa & Alicante Railway has ordered six 100-b.h.p. and four 265-b.h.p. diesel-mechanical railcars from the Renault company of Billancourt, France, and six double-engined double-bogie 280 b.h.p. diesel Littorinas from the Fiat company, Turin. This railway has also ordered from Maquinista Terrestre y Maritima, of Barcelona, ten 4-8-2 steam locomotives, generally similar to the 95 engines of that type now at work on the M.Z.A., but with a boiler pressure of 284 lb. per sq. in. in place of 227 lb. per sq. in.

The Berliner Maschinenbau A.G. has received an order from the South Indian Railway Administration, to the inspection of Messrs. Robt. White & Partners, for one superheated locomotive boiler for YB class engines.

In the announcement in last week's issue concerning the L.M.S.R. orders for freight vehicles, it was stated that the 20-ton hopper wagons would be bogie vehicles. For this capacity and gauge vehicles of the four-wheeled type will, of course, be used.

The Bengal-Nagpur Railway Administration has placed the following orders :—

British Thomson-Houston Co. Ltd.: Transformers and switchgear.
Jonas Woodhead & Sons Ltd.: Laminated bearing springs.
Howell & Co. Ltd.: 300 Aquacidox superheater flue tubes and 4,000 Aquacidox boiler tubes.
J. O'Hara Murray & Co. Ltd.: 4,350 wagon drawbars.

Pennsylvania Railroad's Construction Programme

The Pennsylvania Railroad announces that it will build 10,000 new freight cars and remodel 1,000 of its present freight cars at a total cost of $30,000,000, learns Reuters Trade Service from New York. Some of the 10,000 cars will be built at the company's shops at Altoona, Pitcairn, and Enola in Pennsylvania, but a number of them will probably be built at outside shops.

The Hunslet Engine Co. Ltd. has received an order from the War Office for one 56/62-b.h.p. Hunslet diesel 0-6-0 locomotive for use at Singapore. This locomotive will be employed on the metre gauge and will be fitted with a McLaren engine, Hunslet patent friction clutch and Hunslet automatic preselective gear. The Hunslet Engine Company has also under construction nine diesel locomotives ranging from the new small 10/12-b.h.p. locomotive, one of which is being shown at the Public Works exhibition, up to a 150/165-b.h.p. heavy shunting unit for Egypt.

The Bengal-Nagpur Railway Administration invites tenders receivable by November 19, at 132, Gresham House, Old Broad Street, London, E.C.2, for 502 steel tyres.

Structural Steel required for Railway Workshops

The Argentine State Railways Administration is calling for tenders, to be presented in Buenos Aires by December 6, for the supply of steelwork for extensions and improvements to railway workshops. Further particulars of this call for tenders may be obtained by firms desirous of offering steelwork of United Kingdom manufacture upon application to the Department of Overseas Trade.

XUM

OFFICIAL NOTICES

THE ASSAM-BENGAL RAILWAY COMPANY LIMITED is prepared to receive Tenders for :—

600 TYRES FOR CARRIAGES AND WAGONS.

Specifications and tender forms may be obtained at the Offices of the Company, 56, Victoria Street, S.W.1. A fee of £1 1s. is charged for each Specification, which cannot be returned.

Drawings may be had at the cost of the tenderer by application to Messrs. Hodges, Bennett & Co. Ltd., 78, Queen Victoria Street, E.C.4.

Tenders must be delivered at the Company's Offices not later than Noon on Monday, the 2nd December, 1935.

The Directors do not bind themselves to accept the lowest or any Tender.

By Order of the Board,
W. H. J. GORE,
Secretary.

12th November, 1935.

Royal State Railways of Siam

SEALED Tenders for the supply of Steel Rails (24.8 kgs. per metre) and accessories will be received by the Stores Superintendent, Royal State Railways of Siam, Bangkok, until 14.00 o'clock on 31st January, 1936. Blank tender forms can be purchased from Messrs. Sandberg, 40, Grosvenor Gardens, London, S.W.1, at the price of £2 10s. per set.

THE ADMINISTRATION OF THE ROYAL STATE RAILWAYS OF SIAM.

PATENTS for Inventions, Trade Marks, Advice, Handbook, and consultations free. King's Patent Agency, Ltd. (B. T. King, C.I.M.E., Registered Patent Agent, G.B., U.S., and Canada), 146A, Queen Victoria Street, London, E.C.4. 49 years' references. 'Phone City 6161.

OFFICIAL ADVERTISEMENTS.

OFFICIAL ADVERTISEMENTS intended for insertion on this page should be sent in as early in the week as possible. The latest time for receiving official advertisements for this page for the current week's issue is noon on Thursday. All advertisements should be addressed to :—*The Railway Gazette*, 33, Tothill Street, Westminster, London, S.W.1.

Universal Directory of Railway Officials and Railway Year Book

41st Annual Edition, 1935-36

Price 20/- net.

THE DIRECTORY PUBLISHING CO. LTD., 33, Tothill Street, London, S.W.1.

L.M.S.R. Catering for Johannesburg Exhibition

The L.M.S.R. Hotels Department has accepted an invitation from the Executive Council of the Empire Exhibition to provide a *de luxe* restaurant at the forthcoming Empire Exhibition at Johannesburg, which is due to open in September, 1936. The authorities were anxious to have a typical first class European restaurant as part of the amenities of the exhibition and, following upon wide inquiries among various hotel interests, the L.M.S.R. Hotel Group was able successfully to fulfil the requirements. This will be the first time that a British hotel organisation will be responsible for catering arrangements at an Empire Exhibition Overseas. The plans proposed by Mr. Arthur Towle, Controller of L.M.S.R. Hotels, are that this *de luxe* restaurant will take the form of a facsimile of the famous Restaurant du Soleil at Gleneagles Hotel, Perthshire, a photograph of which is reproduced on page 831. As the closing of that hotel for the winter practically coincides with the opening of the Empire Exhibition, it is proposed to transport the key staff of the restaurant, numbering some 50, to Johannesburg.

Mr. Towle has had considerable experience of catering conditions in the Union, as some years ago he formulated, at the request of the South African Railways, plans for the introduction of restaurant car services in that country. Catering abroad is not new to the L.M.S.R. since it undertook, at the special request of the British Government, the whole of the housing and catering arrangements required by the British Empire Delegation during the Peace Conference in Paris.

The Empire Exhibition at Johannesburg is stated to give every promise of being a second "Wembley." The site is over 100 acres in extent, and is only a mile from the centre of the city. The keynote of the exhibition will be the progress of South Africa and of the Empire during the past fifty years, and it is expected that the majority of the countries forming the British Empire will be represented; the United Kingdom will have a pavilion organised by the Department of Overseas Trade. The exhibition will include eight industrial sections, bands, firework displays, and an amusement park. A feature will be the "Garden of the Empire" which is to contain examples of trees, shrubs, flowers, &c., of the various portions of the Empire, and will be constructed near the Dominion and Colonial pavilions.

London Transport Players in "Show Boat"

Considerable courage has been shown many times in the past by the London Transport Players in their selection of a medium, but never, we think, have they essayed more than at the present time. Beginning on Tuesday, they are presenting at the Scala Theatre each remaining night this week Oscar Hammerstein's famous musical spectacle "Show Boat," and, moreover, this is its first amateur production in London. The two acts, with their total of 15 scenes, demand the services of no fewer than 110 players and there are 27 leading parts. The whole company is drawn from members of the London Transport Musical and Dramatic Society as also is the orchestra, under the direction of Mr. Frederick Doughty.

Mr. Emil Hardy, the Producer and Stage Manager, is deserving of high praise both for his casting and for the excellence of the team work. In a show with comparatively slight incident the singing had no opportunity of being "covered up," and the admirable balance was therefore the more noticeable.

Mr. Cyril Corker was outstanding as "Cap'n Andy," and was ably matched by Miss Gladys Langton as "Julie" and Miss Kathleen Whitfield as "Parthy." The well-known songs "Ol' Man River" and "That Man of Mine" were rendered in a way that will probably revive their popularity for some days to come among many members of the audience.

LONDONDERRY AND LOUGH SWILLY RAILWAY.—Passenger trains (including mixed trains) will cease to run on the Tooban Junction–Buncrana branch of the Londonderry & Lough Swilly Railway on and after December 2, and in substitution therefor passenger road services will be run between Buncrana and Half-way House, 15 in each direction every weekday, with additions on certain days, and eight in each direction on Sundays. Merchandise traffic will be dealt with as usual. During the summer months passenger train services will continue to operate. Notice is also given that on and after December 2 trains will cease to run on the Buncrana–Carndonagh branch, and will be replaced by road passenger and merchandise services. There will be no Sunday passenger road services, and no resumption of train services in the summer months is contemplated for this line.

ROAD ACCIDENTS.—The Ministry of Transport return for the week ended November 9 of persons killed or injured in road accidents is as follows. The figures in brackets are those for the corresponding period of last year :—

	Killed, including deaths resulting from previous accidents	Injured
England ...	117 (123)	3,830 (3,614)
Wales	6 (5)	139 (138)
Scotland ...	10 (15)	532 (379)
	133 (143)	4,501 (4,131)

The total fatalities for the previous week were 157, as compared with 178 for the corresponding period of last year.

XUM

Railway Share Market

The stock and share markets have been firm throughout the week, and at the close quotations in many directions were substantially in favour of holders. "Election markets" have this time brought good profits to many investors who purchased stock a month or two ago. Home railway stocks have been higher, the market being favourably impressed by the plans for new development which, it is anticipated, will prove of valuable assistance to traffic expansion in many directions.

Southern preferred ordinary and deferred ordinary stocks have again returned to popularity, and L.M.S. ordinary stock has been bought on the long view. The demand for stocks of the London & North Eastern has again been steady and the first preference stock has established a higher quotation on the favourable production figures of the iron and steel industry for the past month. Although many brokerage firms continue to exhort their clients not to purchase the deferred stock in preference to the second preference or the preferred ordinary, there is still a fair amount of purchases of the deferred ordinary stock. Although it stands at a relatively low figure it is not considered to have any tangible value in comparison with the senior stocks, as prospects of a dividend on the deferred stock are estimated to be remote. London Transport Board "C" stock has been supported by a good deal of investment buying. In foreign railways interest has centred almost wholly on Argentine railway stocks which have advanced sharply under the influence of favourable reports about impending developments. It appears that the market is impressed with the nature of negotiations taking place between representatives of the railways and a member of the Argentine Government.

There is also importance attached to a hint given by Mr. Runciman that trade agreements with Argentina may be used for making better terms for British enterprises in the country in respect to the remittance home of earnings. It is said that thousands of pounds nominal of stock have been absorbed during the past few weeks by small investors buying £100 nominal of the principal railways' ordinary stocks, such as B.A. Great Southern, B.A. Pacific, B.A. Western and Central Argentine, all of which now stand at very low prices.

Traffic Table of Overseas and Foreign Railways Publishing Weekly Returns

	Railways	Miles open 1934-35	Week Ending	Traffics for Week: Total this year	Traffics for Week: Inc. or Dec. compared with 1934	No. of Weeks	Aggregate Traffics to Date: Totals: This Year	Aggregate Traffics to Date: Totals: Last Year	Aggregate Traffics to Date: Increase or Decrease	Shares or Stock	Prices: Highest 1934	Prices: Lowest 1934	Prices: Nov. 13, 1935	Yield % (See Note)
				£	£		£	£	£					
South & Central America.	Antofagasta (Chili) & Bolivia	830	10.11.35	13,440	– 6,140	45	558,480	656,720	– 98,240	Ord. Stk.	26 3/4	19	20	Nil
	Argentine North Eastern	753	9 11.35	8,813	+ 2,904	19	156,781	145,164	+ 11,617	,,	11	6 7/8	5 1/2	Nil
	Argentine Transandine	—	—	—	—	—	—	—	—	A. Deb.	52	45	48	3 5/16
	Bolivar	174	Oct., 1935	5,300	– 300	43	60,600	59,950	+ 650	6 p.c. Deb.	10	6 1/2	10	Nil
	Brazil	—	—	—	—	—	—	—	—	Bonds.	135 1/4	107 1/16	12	4 5/16
	Buenos Ayres & Pacific	2,806	9.11.35	75,441	+ 11,432	19	1,400,042	1,296,238	+ 103,804	Ord. Stk.	16 1/2	8 1/2	7	Nil
	Buenos Ayres Central	190	26.10.35	$104,400	– $14,500	17	$2,124,800	$2,205,400	– $80,600	Mt. Deb.	23	10	16	Nil
	Buenos Ayres Gt. Southern	5,085	9.11.35	113,220	– 1,727	19	2,262,123	2,289,518	– 27,395	Ord. Stk.	35	22	18 1/2	Nil
	Buenos Ayres Western	1,930	9.11.35	37,720	– 967	19	738,282	770,179	– 31,897	,,	27 1/2	18 1/2	15	Nil
	Central Argentine	3,700	9.11.35	118,402	+ 25,782	19	2,239,133	2,256,812	– 17,679	,,	23	13 1/2	10 1/2	Nil
	Do.	—	—	—	—	—	—	—	—	Dfd.	14	7	5	Nil
	Cent. Uruguay of M. Video	273	9.11.35	13,099	+ 3,639	19	168,540	333,666	– 165,126	Ord. Stk.	15 1/2	3	4	Nil
	Do. Eastern Extn.	311	9.11.35	2,046	+ 86	19	26,490	29,745	– 3,255	—	—	—	—	—
	Do. Northern Extn.	185	9.11.35	1,458	+ 351	19	20,467	16,621	+ 3,846	—	—	—	—	—
	Do. Western Extn.	211	9.11.35	787	– 63	19	14,225	13,649	+ 576	—	—	—	—	—
	Cordoba Central	1,218	9.11.35	32,310	+ 3,410	19	591,440	581,510	+ 9,930	Ord. Inc.	6	3	2	Nil
	Costa Rica	188	Sept., 1935	13,313	– 3,371	13	43,715	49,839	– 6,124	Stk.	30 3/4	23 1/2	34	5 7/8
	Dorada	70	Sept., 1935	12,200	+ 3,000	39	105,500	90,700	+ 14,800	1 Mt. Db.	103	95	102 1/2	5 7/8
	Entre Rios	810	9.11.35	11,240	+ 161	19	223,183	214,459	+ 8,724	Ord. Stk.	21 1/2	12	8	Nil
	Great Western of Brazil	1,082	9.11.35	9,300	– 5,200	45	339,600	378,800	– 39,200	Ord. Sh.	7/8	5/8	5/8	Nil
	International of Cl. Amer.	794	Sept., 1935	$284,242	+ $4,429	39	$3,549,252	$3,639,904	– $90,652	—	—	—	—	—
	Interoceanic of Mexico	—	—	—	—	—	—	—	—	1st Pref.	1/–	1/–	1/2	Nil
	La Guaira & Caracas	225/4	Oct., 1935	2,900	– 300	43	37,885	36,065	+ 1,820	Stk.	12 3/4	7 5/8	8 1/2	Nil
	Leopoldina	1,918	9.11.35	18,712	– 3,464	45	803,887	1,003,816	– 199,929	Ord. Stk.	14 5/8	7	4	Nil
	Mexican	483	7.11.35	$215,100	+ $3,300	18	$4,525,200	$4,138,300	+ $386,900	,,	3 1/4	1 1/2	1/2	Nil
	Midland of Uruguay	319	Oct., 1935	6,499	– 6,439	17	22,345	38,789	– 16,444	,,	1 1/2	1/2	1 1/2	Nil
	Nitrate	401	31.10.35	9,107	+ 3,658	43	126,964	110,252	+ 16,712	Ord. Sh.	3 29/32	51/–	2 5/8	Nil
	Paraguay Central	274	2.11.35	$1,945,000	+ $882,000	18	$34,620,000	$17,427,000	+ $17,193,000	Pr. Li. Stk.	84	67	77 1/2	7 3/4
	Peruvian Corporation	1,059	Oct., 1935	81,893	+ 17,486	17	299,665	250,845	+ 48,820	Pref.	14 1/2	8	10	Nil
	Salvador	100	2.11.35	¢10,101	+ ¢672	18	¢214,322	¢170,992	+ ¢43,330	Pr. Li. Db.	75	70	65	7 11/16
	San Paulo	1531/2	3.11.35	21,692	– 1,633	44	1,117,761	1,189,949	– 72,188	Ord. Stk.	86	67	40	6 1/4
	Taltal	164	Oct., 1935	3,390	+ 1,090	17	12,640	9,205	+ 3,435	Ord. Sh.	2 1/8	1 7/16	1 3/8	7 1/4
	United of Havana	1,353	9.11.35	13,647	– 2,503	19	304,361	315,498	– 11,137	Ord. Stk.	6	2	2	Nil
	Uruguay Northern	73	Oct., 1935	765	– 367	17	2,527	4,444	– 1,917	Deb. Stk.	6 1/4	3	4 1/2	Nil
Canada.	Canadian National	23,697	31.10.35	1,160,887	+ 35,504	43	28,591,217	27,553,200	+ 1,038,017	—	—	—	—	—
	Canadian Northern	—	—	—	—	—	—	—	— 4 p.c.	Perp. Dbs.	78 1/4	51 1/2	65	6 1/8
	Grand Trunk	—	—	—	—	—	—	—	—	4 p.c. Gar.	104 1/2	97 1/4	99 1/2	4
	Canadian Pacific	17,224	7.11.35	571,400	+ 31,200	44	21,819,200	21,270,800	+ 548,400	Ord. Stk.	18 5/16	11 1/16	10	Nil
India †	Assam Bengal	1,329	20.10.35	37,740	+ 417	29	666,123	775,438	– 109,315	Ord. Stk.	88 1/2	72	80 1/2	3 3/4
	Barsi Light	202	20.10.35	2,482	– 143	29	75,997	80,332	– 4,335	Ord. Sh.	10 1/2	9 3/4	7 8 1/2	6 3/8
	Bengal & North Western	2,114	20.10.35	63,658	+ 6,003	3	121,412	115,391	+ 6,021	Ord. Stk.	297 1/2	262	296 1/2	5 5/8
	Bengal Dooars & Extension	161	10.10.35	4,116	– 1,498	27	68,922	79,018	– 10,096	,,	125 1/4	124	122 1/2	5 11/16
	Bengal-Nagpur	3,268	10.10.35	171,000	+ 13,553	27	3,309,999	3,052,936	+ 257,063	,,	105 1/2	96	102 1/2	3 7/8
	Bombay, Baroda & Cl. India	3,072	31.10.35	238,200	+ 750	30	4,511,625	4,519,350	– 7,725	,,	115	108 1/2	112 1/2	5 5/16
	Madras & South'n Mahratta	3,230	10.10.35	132,075	– 18,785	27	2,810,286	3,109,652	– 299,366	,,	131	122 3/4	120 1/2	7 7/8
	Rohilkund & Kumaon	546	20.10.35	11,180	– 118	3	21,067	22,208	– 1,141	,,	263	250	293 1/2	5 7/16
	South India	2,526	10.10 35	114,611	– 15,540	27	2,148,961	2,262,265	– 113.304	,,	119	115	109 1/2	7
Various.	Beira-Umtali	204	Aug., 1935	69,967	+ 1,369	48	710,272	587,777	+ 122,495	—	—	—	—	—
	Bilbao River & Cantabrian	15	Oct., 1935	1,695	+ 1,171	43	15,053	16,719	– 1,666	—	—	—	—	—
	Egyptian Delta	622	20.10.35	10,117	+ 1,889	28	121,536	121,099	+ 437	Prf. Sh.	21 5/16	13 4	15 4	5 11/16
	Great Southern of Spain	104	2.11.35	2,924	+ 149	44	79.282	98,630	– 19,348	Inc. Deb.	4	3 1/2	3 1/2	Nil
	Kenya & Uganda	1,625	Sept., 1935	166,857	+ 17,443	39	1,808,941	1,694,916	+ 114,025	—	—	—	—	—
	Manila	—	—	—	—	—	—	—	—	B. Deb.	50	33	37	9 7/16
	Mashonaland	913	Aug., 1935	117,688	– 2,319	48	1,277,362	1,076,622	+ 200,740	1 Mg. Db.	101	91 3/4	101 1/2	4 15/16
	Midland of W. Australia	277	Sept., 1935	14,150	+ 512	13	37,202	39,590	– 2,388	Inc. Deb.	100	93	94 1/2	5 5/16
	Nigerian	1,905	21.9.35	20,403	– 15,079	25	576,153	646,132	– 69,979	—	—	—	—	—
	Rhodesia	1,538	Aug., 1935	203,069	+ 5,376	48	2,125,732	1,808,818	+ 316,914	4 p.c. Db.	104 7/8	97 1/2	103§	3 7/8
	South African	13,246	19.10.35	610,732	+ 104,178	29	16,030,328	14,557,030	+ 1,473,298	—	—	—	—	—
	Victorian	4,728	July, 1935	713,389	+ 20,391	4	713,389	692,998	+ 20,391	—	—	—	—	—
	Zafra & Huelva	112	Sept., 1935	12,860	– 1,697	39	101,435	102,566	– 1,131	—	—	—	—	—

NOTE.—Yields are based on the approximate current prices and are within a fraction of 1/16

† Receipts are calculated @ 1s. 6d. to the rupee. § ex dividend. Salvador and Paraguay Central receipts are in currency.

The variation in Sterling value of the Argentine paper peso has lately been so great that the method of converting the Sterling weekly receipts at the par rate of exchange has proved misleading, the amount being overestimated. The statements from July 1 onwards are based on the current rates of exchange and not on the par value

Electric Railway Traction

Power Distribution on the Underground

CARRYING over 445,000,000 passengers a year in 3,156 vehicles over a route mileage of 227, the railways of the London Passenger Transport Board could be styled the world's greatest electrification system without injustice to any of the many other electrified networks of the surface or underground types. The first nerve-centre of this complicated transport system is the power supply; the second, the power distribution; and the third, the motive power. An important phase of the second nerve-centre, the operation of the rectifier substations of the underground railways was covered by Mr. A. L. Lunn in a paper read and discussed before the Institution of Electrical Engineers on November 7, and this is abstracted elsewhere in this issue. Although the installed capacity of rectifier units on the London Underground system is only 30 per cent. of the total of 186,800 kW. of converting apparatus, and the average load taken by these sets only 10 per cent. of the whole (due to their location in the recent outer extensions), the use of this type of equipment has certain outstanding advantages for an electrified system over which is operated an extremely frequent service of trains. The use of rectifiers is likely to increase on the Underground, especially as new extensions will probably take a 50-cycle supply from the grid, under which conditions the rectifier has enhanced advantages over the converter.

Principal among the advantages is the insensitivity of the rectifier to great fluctuations in the voltage or frequency of the a.c. supply, for the delays to traffic and consequent loss of revenue when rotary converter plant falls out of step from this cause, are usually serious. Provided the voltage does not fall below 50 per cent. of the normal, rectifier plants do not seem to be affected by supply variations. The lesser area of the site and the noiseless operation are factors which influence considerably the choice of rectifiers for installation in a busy urban area. Unlike many modern installations, the main transformers are located indoors, a feature decided upon partly in order to reduce to a minimum the length of the highly-insulated leads, and because of the peculiarity of Underground practice in the use of air-blast main transformers in place of the oil-cooled type which are almost universal for railway work. The preference of the Underground for the air-blast pattern had its genesis in an oil explosion a good many years ago, and of course any risk of such a happening is much more serious in a built-up area than in the country. Another characteristic of present rectifier practice on the Underground is that throughout the western extension only one make of rectifier is used, and on the northern extension another. It is satisfactory to note that no cases of complaint arising out of interference in telephone or radio circuits has been recorded since rectifiers were installed, even when full smoothing circuits have not been incorporated.

Electrification in North and South

A FURTHER step in the large scale electrification of British railways has been taken by the decision of the Government to support by financial arrangements closely resembling those of the recent London transport scheme three projects for the conversion of lines in various parts of the country, a step which we foreshadowed in the issue of this Supplement for August 23, and again in the issue of October 18. The most important of these schemes is the vast extension of the Southern Railway electrified area to the limits of Portsmouth in the west, Hastings via Tunbridge Wells in the south, and Chatham in the east. The complete programme involves the conversion to the 600-volt d.c. system of about 252 route miles of line comprising the lines from Hampton Court junction to Portsmouth via Woking and Guildford; Weybridge to Staines, conversion work on which has begun already; Woking to Farnham and Alton; Dorking to Arundel junction; West Worthing to Havant and the branches from this line to Littlehampton and Bognor; Sevenoaks to Hastings and Bexhill West via Tunbridge Wells; Gravesend to Strood; Swanley Junction to Strood, Chatham, and Gillingham; Strood to Maidstone. The construction of the new line from Motspur Park to Leatherhead also comes under this scheme, although it has already been sanctioned for some time and work actually begun. A most surprising omission is the line from Three Bridges to Horsham, which carries quite as heavy a traffic as the Dorking-Horsham section, and incidentally forms, in conjunction with the line from Christ's Hospital to Shoreham a valuable alternative route to Brighton and the Sussex coast. Other connecting and spur lines within the network which are not at the moment scheduled for conversion are those from Otford to Maidstone; and from Farningham junction to Gravesend West—and the Oxted line remains forlorn.

The most interesting technical conversion scheme now backed by the Government is that relating to the Sheffield-Manchester main line of the L.N.E.R., estimates for which were first got out as long ago as 1927. This 41-mile double-track division has long grades of 1 in 100 to 1 in 135 where it crosses the Pennines, and carries heavy passenger and goods traffic. It has been considered as a fit section for future electrification more than once, particularly in view of the arduous operating conditions through the 3-mile Woodhead tunnel which is on a grade of 1 in 201 at the summit of the west side of the bank. Previous estimates have not shown conversion to be a paying proposition, largely on account of the number of ancillary works which would have been necessary. Perhaps these conditions have been modified by such works as the new marshalling yard at Dinting. Some disappointment must be felt, in view of the decision to electrify certain L.M.S.R. lines in the Wirral peninsula, that nothing has been done for the suburban lines round Manchester, where electrification is required more urgently. It is probable, however, that the extremely complicated nature of the problem of converting the dense network in south-east Lancashire has prevented the investigations reaching a stage where Government guarantees might be fairly claimed, but it is not unlikely that some announcement will be made ere long. At the moment the proposals for electrifying the lines in the Wirral peninsula are rather nebulous, and it will not be surprising if the final details show that electrification is to be extended to other lines than those from Birkenhead to New Brighton and West Kirby, the intended conversion of which has just been announced.

XUM

THE LONDON UNDERGROUND RAILWAYS

Supply and distribution systems with special reference to the use of rectifier equipments

*By A. L. LUNN, M.I.E.E.**

A PAPER of altogether exceptional interest and value was read before the Institution of Electrical Engineers on November 7 by Mr. A. L. Lunn. Entitled "Equipment and Performance of Steel-Tank Rectifier Substations operating on the Underground Railways of the London Passenger Transport Board," it went beyond this title, and included notes on the whole supply system and the total daily load. Some of Mr. Lunn's remarks are reproduced below.

Supply System

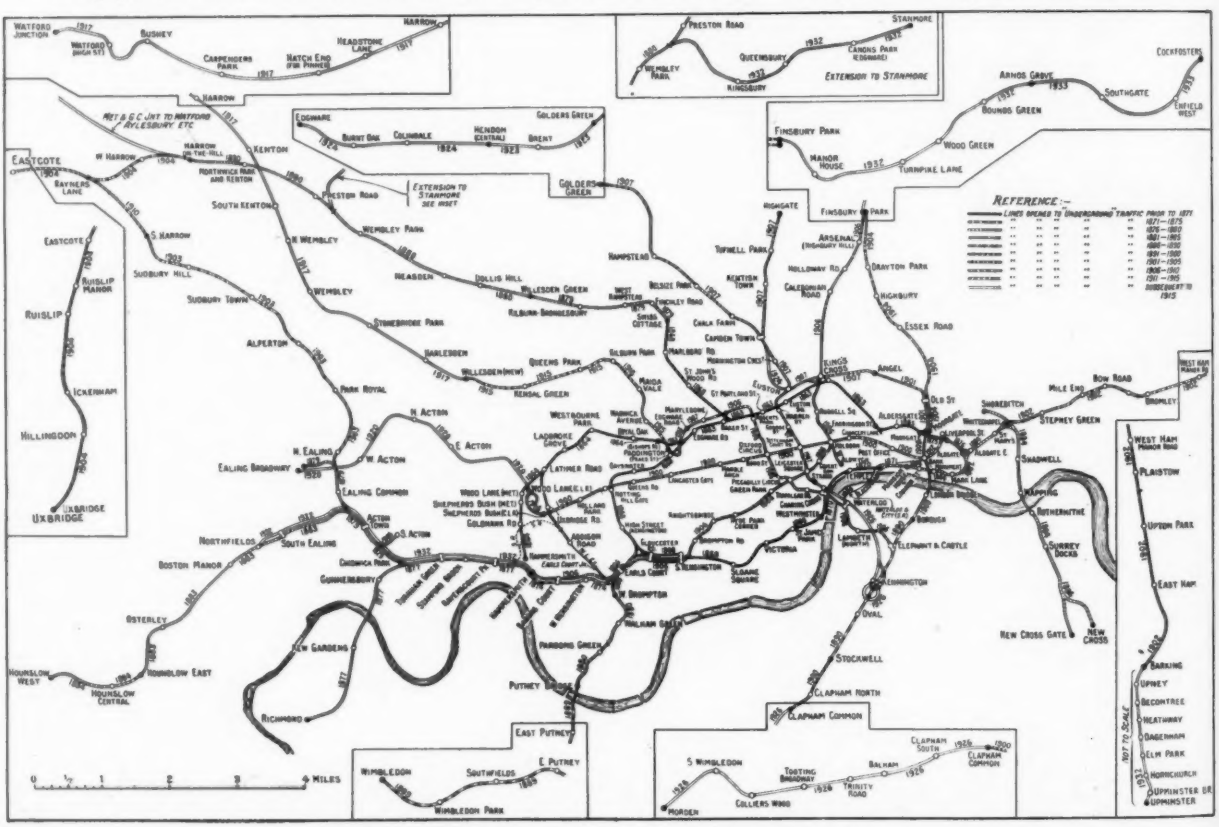
The complete supply system from Lots Road power station to the rotary-converter and rectifier substations is shown in the first of the accompanying drawings. The main switch-houses are at Alperton and Ravenscourt Park in the western area; at Leicester Square in the central area; and at Wood Green in the northern area. The substations served by Alperton and Wood Green are all of the rectifier type. On the Piccadilly line the rectifier substations, with the exceptions of those at Baron's Court and Chiswick Park, are remotely-controlled from one of the main control rooms, which are located in the switch-house buildings at Alperton, Leicester Square, and Wood Green. The above exceptions, and also the Hendon plant, are controlled from the most convenient manually-operated substations; Clapham Common substation is operated locally, but is fitted for remote control.

* In a paper read before the Institution of Electrical Engineers.

At several points alternative power supplies are available from either Lots Road or Neasden; normally the power is taken from Lots Road except in the case of Hendon and Burnt Oak substations, which are fed from Neasden. Bulk supplies from outside sources are taken at Wood Green switch-house and at Clapham Common and South Wimbledon substations. The installed rectifier capacity is 58,000 kW. in 15 substations with an approximate daily input of 248,000 kWh., of which 112,500 kWh. are supplied by Lots Road, equivalent to only 10·4 per cent. of the output of that generating plant, which averages 1,086,000 kWh. per day, including Sundays. A typical load chart from the Underground Railways is given in an accompanying illustration.

Rectifier Plants

During 1928 the claims made for steel-tank rectifiers decided the Underground engineers to give this type of plant a trial, and at the end of 1930 a 1,500 kW. 630-volt (d.c.) unit was brought into operation at Hendon on the Morden-Edgware line. The success of its operation led to orders being placed for 55,000 kW. of rectifier equipment for the then projected extension of the Piccadilly line, and for installation in a new substation required at Chiswick Park. Each rectifier substation is supplied with power from the distributing plant over duplicate e.h.t. feeder cables which, as a precautionary measure, are laid in



Chronological map of the London Underground railways

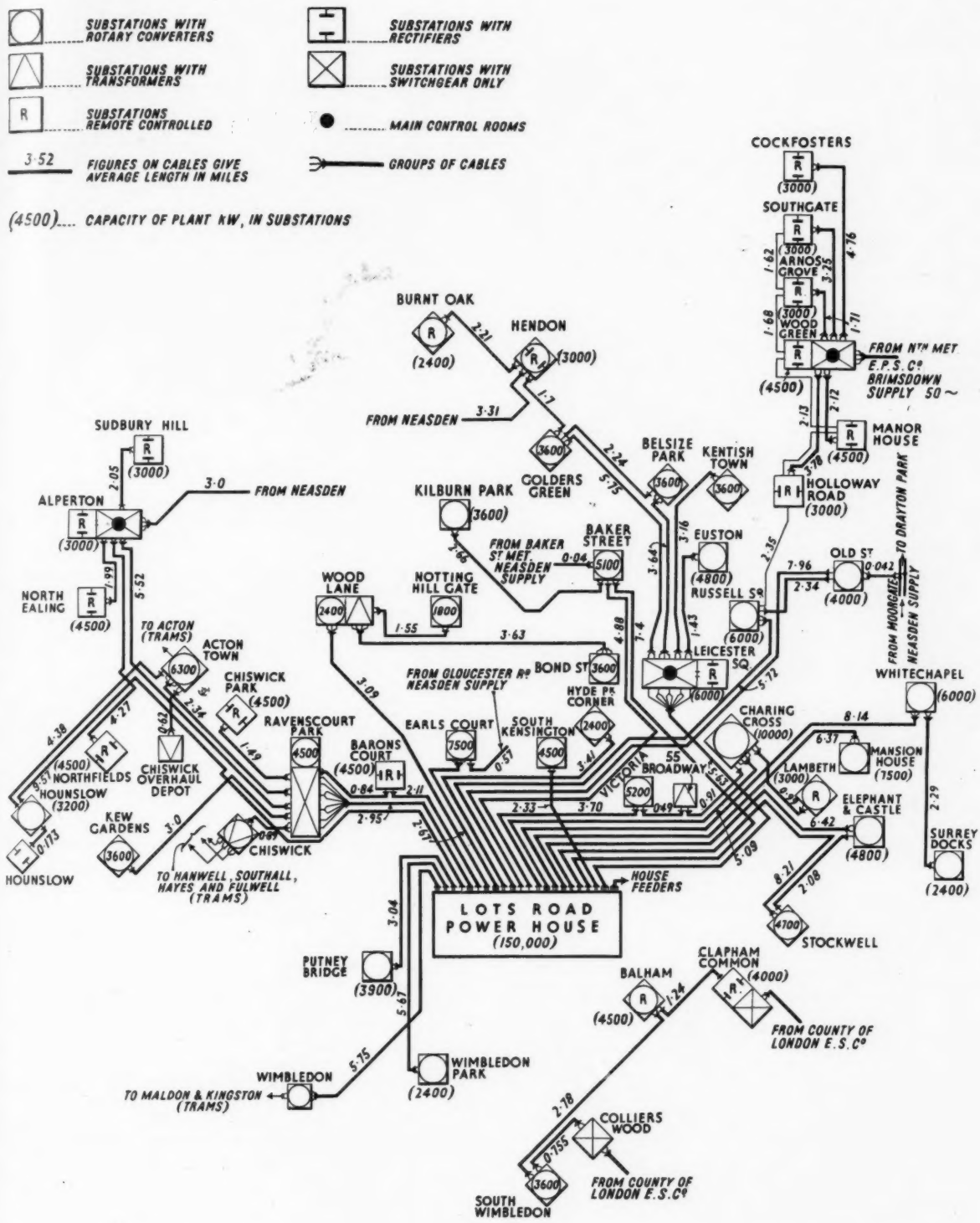


DIAGRAM SHOWING THE SUPPLY NETWORK AND THE LOCATION OF THE TRACTION SUBSTATIONS OF THE UNDERGROUND RAILWAYS BELONGING TO THE LONDON PASSENGER TRANSPORT BOARD

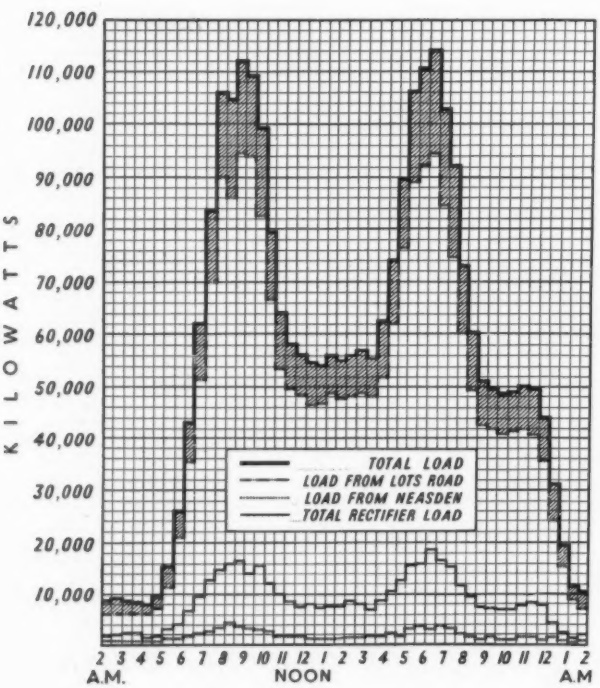
different tunnels on the underground section, and on opposite sides of the track in open sections.

Rectifiers of different manufacture are installed on the western and northern extensions respectively, and thus there is not absolute uniformity in the substation layouts; however, the differences are of a very minor character. Generally, a basement type of building has been adopted and the rectifier sunk partly through the floor, thus facilitating connection to the cathode and improving the accessibility of the plant as a whole. The rectifiers are located immediately adjacent to the transformers. As the traction system is operated with both positive and negative conductor rails insulated from earth, the rectifier tank and auxiliaries assume approximately positive potential, and are therefore grouped in a single enclosure for convenience and maximum safety.

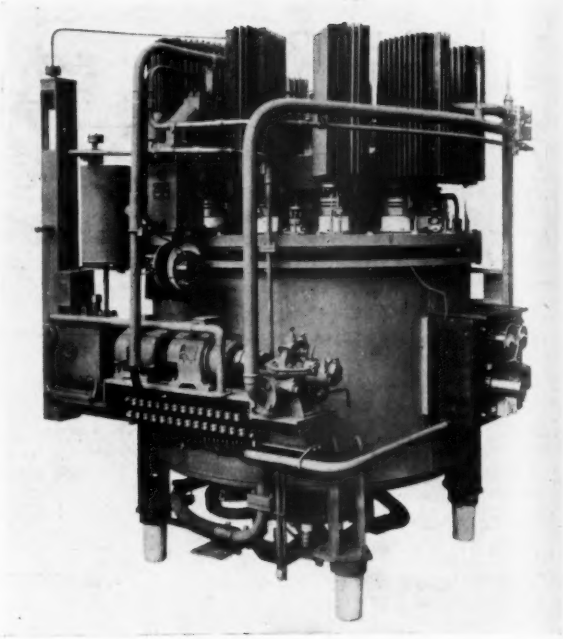
If necessary, all the substation equipment can be controlled locally from the substation control board. The d.c. busbars and the lower part of the e.h.t. switchgear are separated from the rest of the substation by a brick wall behind the control panels, and the d.c. busbars are mounted on insulating supports just behind this wall. The isolating switches for the whole of the d.c. switchgear are located in openings in the brick wall.

Power is supplied to the rectifiers at 11,000 volts, 3-phase, all units in service on the system being of the 12-anode type and rated for 630 volts (d.c.) at full load. The frequency of supply is either 33⅓ cycles or 50 cycles, respectively, according to whether power is taken from the power houses of the London Passenger Transport Board or from outside sources. All rectifiers have overload ratings of 50 per cent. for one hour and 200 per cent. momentarily, the units employed being of 1,500 and 2,000 kW. capacity.

Few features of the rectifier tanks themselves call for comment. The anode plate is detachable, examination of the interior of the vacuum chamber entailing the breaking of one main seal only; and the arrangement of the water jackets is such as to allow of their easy removal, without impairing the rectifier vacuum, for the purpose of cleaning the water spaces.



Typical load chart of the London Underground



1,500 *kW. B.T.H. rectifier as used on the Cockfosters extension, L.P.T.B.*

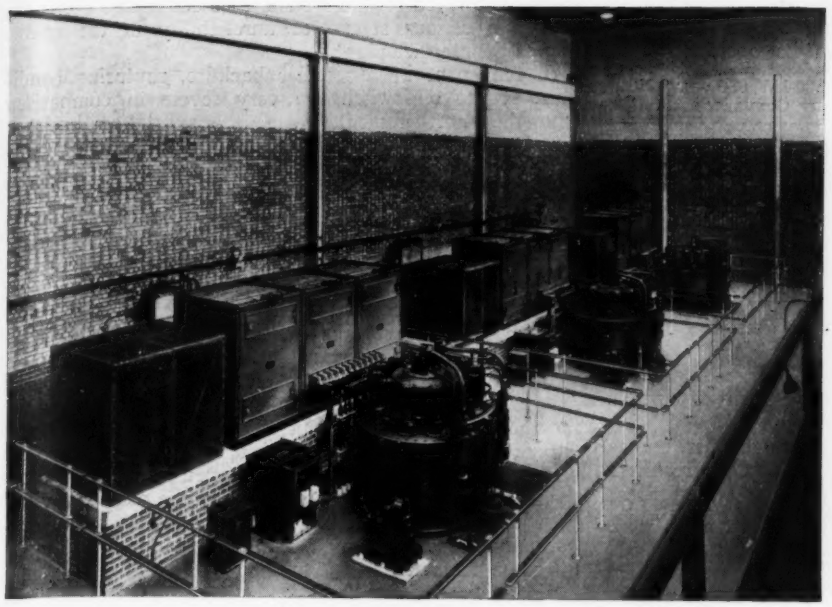
Cooling of the anodes is effected by means of water-filled radiator tanks in the case of northern extension rectifiers only, the makers of the western extension rectifiers considering air cooling by means of finned radiators to be sufficient. Some difference exists, also, in the respective methods employed on the two types of unit for sealing the anodes, the northern extension rectifiers being provided with mercury-type anode seals, whilst on the western extension units a special form of vitreous-enamel anode seal is utilised.

In accordance with the latest practice the anode tips are of graphite, the makers claiming that anodes of this construction give better service than metal anodes, being capable of withstanding more severe conditions of loading than are the latter type.

The main transformer connection employed on the northern extension equipments is delta/double 6-phase double star, whilst that employed on the western extension equipments is star/double diametric, protection against breakdown in the secondary windings due to the heavy surging liable to occur when load is applied to a cold rectifier being provided by connection across the windings of substantially constructed gap arrestors. Whilst use of 12-phase working would have had certain advantages, these would scarcely have justified either the added expense, or the greatly increased complication of the transformer windings, which would have been entailed by this form of connection. The main transformers of all the equipments at present in operation on the system are of the air-blast-cooled type, arranged in three single-phase units. Future equipments at present under construction are, however, to be provided with 3-phase transformers.

Operation

The experience that has been gained in the operation of the rectifier installations described has been highly



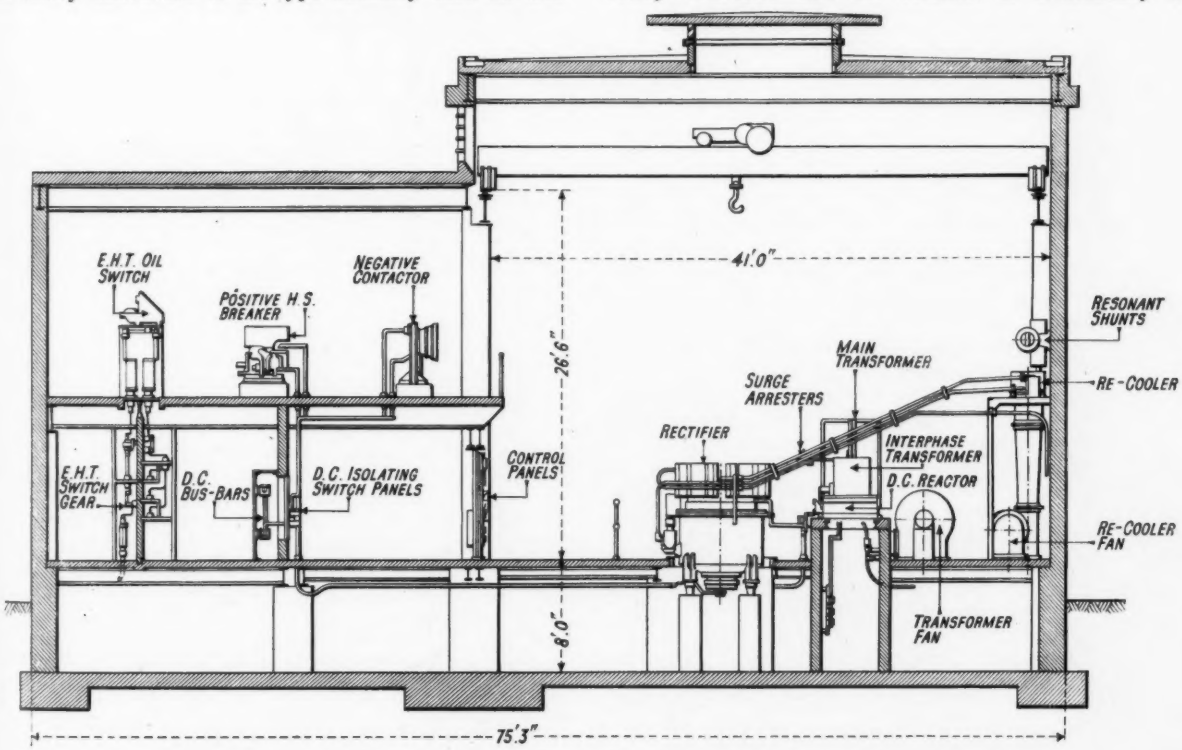
Interior of Chiswick Park substation showing a G.E.C. 1,500 kW. rectifier unit

satisfactory, the standard of reliability maintained by the plant having been such as to prove beyond all doubt the general suitability of the steel-tank rectifier for meeting the exigencies of a heavy traction load.

Efficiency and Power Factor Harmonics

By reason of the very high efficiency characteristics of rotary convertors of the type normally used for traction purposes in this country, the advantage shown in favour of the 630-volt rectifiers under discussion is not so marked as that indicated by previously published data in which comparison is drawn between rectifiers and rotary convertors of foreign manufacture. This is illustrated by the comparative efficiencies set out in the accompanying table, which refers to typical 33⅓-cycle rectifier and rotary-convertor units operating in the railway substations, the rotary convertor having the higher efficiency at load factors greater than about 54 per cent. On a fluctuating load, however, the low light-running losses of the rectifier—which in the case of the particular unit referred to, amount to approximately 18 kW.—tend to improve the all-day efficiency of the rectifier when operating at the load factor mentioned above, that of the rotary convertor working at the same load factor—the light-running losses of the latter unit being approximately 39 kW. It should be noted, also, that when similar comparison is made between units designed for operation at a frequency of 50 cycles the rectifier appears to somewhat greater advantage, by reason of the appreciably lower efficiency of the rotary convertor when operating at the higher frequency.

In making comparison between the efficiencies of the rotary convertor and the rectifier, it is necessary to



Cross section of a typical rectifier substation on the London Underground

remember that such advantage as may be shown in favour of the latter is offset to some extent by the additional losses in distribution resulting from its operation—due

COMPARATIVE OVERALL EFFICIENCIES OF 1,500-kW, 630-VOLT (D.C.), 33⅓-CYCLE RECTIFIERS AND ROTARY CONVERTORS

Fraction of Full Load	¼	½	¾	1	1¼
Rectifier unit	92·10	93·85	94·00	93·70	93·25
Rotary-convertor unit ..	90·25	93·70	94·55	94·65	94·35
Percentage difference in favour of rectifier ..	1·85	0·15	−0·55	−0·95	−1·10

to the lower power factor, which varies according to the condition of loading from approximately 0·93 to 0·94, and to the introduction into the system of additional harmonics owing to the distorted wave-form of current taken from the supply.

As regards this latter characteristic of rectifier operation, it is now generally recognised that where rectifiers form a high proportion of the total system load there arises the possibility that serious distortion of the system voltage wave may occur to a degree dependent upon the capacity of the rectifier plant supplied, and the impedance at harmonic frequencies of the supply system; moreover, the harmonic and reactive loading imposed on the system may be such that under certain circumstances de-rating of the power-house generators may prove to be unavoidable.

In cases where rectifiers form only a small proportion of the total load on the system, distortion of voltage and current waves becomes of little practical importance; this is the state of affairs on the power supply system of the Underground Railways, where the proportion of rectifier loads to the total load supplied from Lots Road power house amounts to 10 per cent. only, at the peak. In this particular case also, since the total rectifier load on the power house is due in almost equal proportion to equipments utilising star-connected transformer primaries and to those utilising delta-connected transformer primaries, the resultant wave-form of rectifier current taken from the generators tends to approximate to that corresponding to 12-phase operation, thus reducing to a great extent the magnitude of the harmonics appearing in the system.

Effect of D.C. Ripple on Traction Motors

At the outset, some uncertainty existed as to the probable effect on the traction motors of the pronounced ripple appearing in the d.c. outputs of rectifiers not provided with full smoothing circuits. Various load tests on machines of the type used on the Underground Railways were therefore arranged and carried out by the contractors, and a comparison was obtained of the heating of the motor windings, when supply was taken in the first instance from rotary convertors, and in the second instance from a rectifier operating at 33⅓ cycles with no series choke in circuit, the conditions under which the motors were run in this latter case obviously being somewhat more severe than those normally obtaining in practice. Nevertheless, there was no appreciable difference in heating or commutation of the motors in the two cases, this leading to the conclusion, confirmed by later experience, that no difficulty was to be expected in this direction.

Backfire

There are on record comparatively few cases of rectifiers having failed due to the occurrence of backfire, and it may fairly be concluded that the improvements incorporated both in the design and the construction of the two types of unit employed on the system have eliminated the backfire as a serious source of unreliability in the operation of the rectifier plant.

In the event of a rectifier backfire, rupturing conditions at the oil switch are very severe in comparison with the short-circuit kVA. at the substation busbars. This became evident as a result of a failure which occurred during the initial trials at Hendon substation when, owing to a disturbance in the a.c. supply network, rotary convertors working in parallel with the rectifier fell out of step, leaving the latter to cope with the full load on the section, the resulting overload, estimated at about 300 per cent., causing the rectifier to backfire violently shortly before the rotary-convertor plant was restored to service. Though no damage was caused either to the rectifier itself or to the transformer, later examination of the oil switch showed this to have suffered very severely, in spite of the fact that it was of normal rupturing capacity for the possible short-circuit kVA. As a result of this experience, a new oil switch of higher rupturing capacity was provided on the Hendon equipment, and every other rectifier installed on the system was at the outset provided with a switch of higher capacity than that which would normally be required by a rotary convertor operating in the same substation.

Rectifier Tanks

On two occasions during the period of operation of the rectifier plant, it has been necessary to open up the vacuum chamber of a unit for inspection. This work was undertaken in the first instance after a severe backfire had occurred on a rectifier that had been in service for approximately 16 months, since it was suspected that the cause of the breakdown was a defective anode insulator—a suspicion which subsequently proved to be incorrect. The opportunity was taken of making a very thorough general inspection of the interior of the unit, and it was found that the condition of all parts was excellent, there being no indication of damage having been caused by the backfire.

On the second occasion a rectifier was opened up for inspection after the breakage of a defective ignition anode. As in the previous case, the condition of all anodes and shields was found to be excellent and no sign of deterioration of any kind was observed.

Vacuum sealing of the rectifiers has been found to be efficient and reliable, the average rate of leakage as obtained from a number of tests on both northern extension and western extension units being from 0·4 to 0·45 micron per hour in cases where mercury-type anode seals are employed, and somewhat less on those units provided with the vitreous-enamel type of seal.

The formation of considerable quantities of sludge in the cooling systems of rectifiers of the western extension type led to the discovery that excessive aeration of the rectifier cooling water was occurring at the point of discharge into the make-up tank, investigation in one particular instance revealing the fact that the oxygen content of the inlet water to the rectifier amounted to about 3·5 cm.³ per litre, while that of the outlet water amounted to about 2·5 cm.³ per litre. Inspection of this rectifier, which had been in service for approximately three years, showed that the water spaces were extremely dirty—the tank being thickly coated with heavy deposits. Careful examination of the tank surface indicated, however, that the corrosion that had occurred was relatively slight and of little practical importance. Steps are being taken at the present time to convert the cooling systems of rectifiers of this type to the closed-circuit system—a modification that is easily effected—and it is not anticipated that sludging will continue to any great extent once this work has been completed.

XUM

Articulated Trains in Holland

A departure from previous Netherlands Railways electrification practice is the introduction of streamlined articulated stock, capable of higher speeds than previously

WHEN it was decided to electrify the line of the Netherlands Railways from Rotterdam (Schiedam) to the Hook of Holland the design of some two-car articulated electric trains was put in hand, and although these sets were not ready in time for the opening on May 15, they have been introduced gradually since the beginning of July. One of them was used for the official opening ceremony of the Haarlem-Zandvoort section on October 6, and they are used also on the fast trains between Amsterdam and Rotterdam. Over this last-named line one of the trains is reported to have attained 162 km.p.h. (100·6 m.p.h.) during a trial run.

Generally similar in construction to the triple-unit diesel-electric trains, these eight two-car sets operate on the standard Dutch 1,500 volts d.c. system, and seat second and third class passengers only, 96 of the former and 18 of the latter. Lavatory and luggage accommodation is provided. The weight is 76 tonnes (74·8 tons), equivalent to 1,460 lb. per seat. The maximum normal speed is 150 km.p.h. (93 m.p.h.) and the power capacity is sufficient for the train to be accelerated on the level from rest to this velocity in 3½ min. From a speed of 100 km.p.h. (62 m.p.h.) these trains can be brought to rest in 300 m. (328 yd.), and from 140 km.p.h. (87 m.p.h.) in 640 m. (700 yd.). Welding has been used in the fabrication of the body framing and bogies. The bogies are fitted with S.K.F. roller bearing axleboxes and have a comprehensive system of springing, including two sets of triple-laminated springs for the bolster and helical springs on the side equalising beams. The streamlined contour of the bodies extends downwards to within a few inches of rail level in the form of shrouds over the bogies and underframing.

The train is driven by four nose-suspended traction motors located two on each outer bogie. The pantographs are raised by springs and lowered by compressed air, and are fitted with carbon wearing strips. Two of the trains are fitted with a simple form of air conditioning, and another interesting item of equipment, which is fitted to all the sets, is the Scharfenberg automatic coupler which couples two sets of vehicles mechanically, electrically, and pneumatically. This coupler is fitted to the 40 diesel trains in Holland and was described in the *Diesel Railway Traction Supplement* for December 28, 1934. The electrical equipment of the new electric trains was supplied by Heemaf (Hengelo) and Smit (Slikkerveer); the bodies, bogies and mechanical portions generally were built by Werkspoor, Beijnes, and Allan.

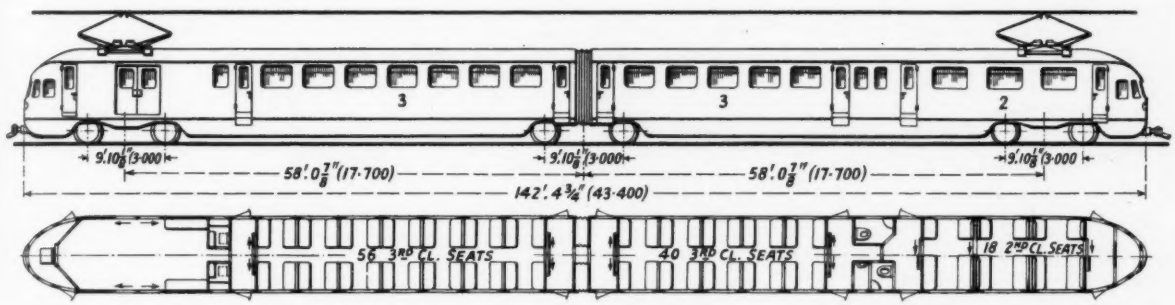
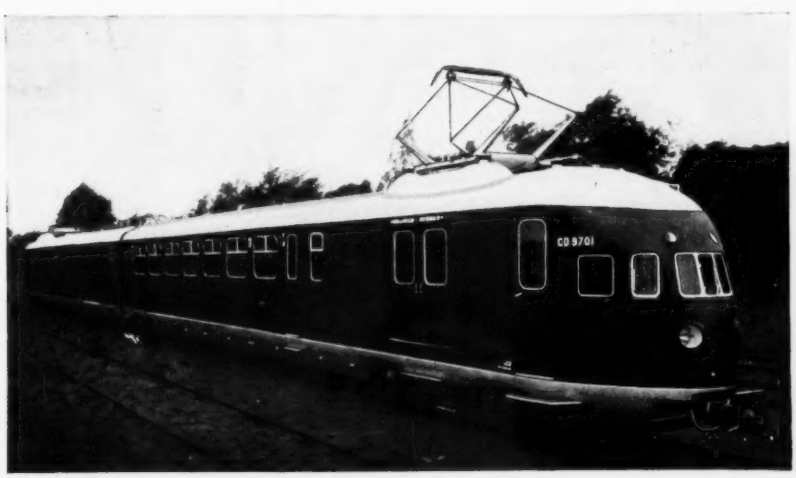


Diagram of new electric trains for fast services in Holland



One of the two-car articulated sets just set to work on the 1,500-volt d.c. electrified sections of the Netherlands Railways. They are fitted with the Scharfenberg coupler for connecting automatically the electric and pneumatic circuits, at the same time as the sets are coupled mechanically

NOTES AND NEWS

New Subway in Tokyo.—Powers to construct a subway between Shibuya and Shimbashi, 3·7 miles, have been granted to the Tokyo Rapid Transit Company, and construction is to be pushed ahead immediately.

Swiss Works.—The 1936 budget of the Swiss Federal Railways contains allowances for the electrification of the Giubiasco–Locarno and Gossau–Sulgen lines. Four high-speed electric railcars and some electric shunting locomotives also figure in the expenditure list.

Glasgow Subway.—Since the inner circle of the Glasgow subway (belonging to the Glasgow Corporation) was electrified in the spring, the receipts have gone up by over £100 a week, and when the outer circle is opened to electric traction during the course of the present month, it is expected that the receipts will increase at a more rapid rate.

Spanish Locomotives.—Brown Boveri & Co. is building 12 express locomotives of the 2-C_0 + C_0-2 wheel arrangement for the Madrid–Avila line of the Northern Railway of Spain, which is now in course of electrification on the 1,500-volt d.c. system. These locomotives will weigh about 143 tons, and will have the Brown Boveri system of individual axle drive.

Italian Electric Stock.—During the period October, 1934, to October, 1935, the Italian State Railways ordered, at a cost of 210,000,000 lire, 213 electric locomotives and 24 motor coaches, a large number of which are now in service. The six three-car streamlined trains ordered from the Soc. Ernesto Breda, of Milan, were illustrated in THE RAILWAY GAZETTE, for January 18, 1935.

Swedish Projects.—The Swedish Railway Board has submitted to the Government a request for a sum equivalent to £780,000 (at the present rate of exchange) for the furtherance of electrification work during 1936. About 25 per cent. of the money is earmarked for the completion of conversion of the Laxaa–Charlottenberg, Södertalje–Eskilstuna, and Upsala–Gäfle lines. Small lines totalling 70 miles in length are to be electrified also.

Met-Vick Personnel.—The Metropolitan-Vickers Electrical Co. Ltd. has issued in book form a register of the apprentices and trainees who passed through its works during the period 1902-1934. This company has always devoted special attention to the training of its personnel, especially to incoming juniors. Copies of this register are being sent to all the ex-apprentices and ex-trainees of whose addresses Met-Vick have a record.

Articulated Trains in New York.—The Brooklyn-Manhattan section of the New York Rapid Transit Company has ordered 15 five-car articulated electric train sets from the Pullman-Standard Car Manufacturing Company, and ten train sets from the St. Louis Car Company. The first type will have G.E.C. traction motors, and the second type Westinghouse motors, both makes being fitted with S.K.F. roller bearings on the armature shafts.

Belgian Electrification.—Since the electrification of the Brussels–Antwerp line the number of passengers carried between these two cities has increased by over 20 per cent., and the number of season-ticket holders by 12 per cent. It is intended to increase the number of trains from 114 to 150 a day, and to stop a greater number at Malines; it is proposed also to stop some of the electric trains at Vilvoorde. The possibility of electrifying the Brussels–Luxembourg line is being considered afresh, and a parliamentary committee has voted in its favour, after two experts pronounced it to be economical with present traffic. However, other experts consider a 50 per cent. increase to be necessary for the work to pay. The electrification of the Brussels (Midi)–Charleroi line also has come under the purview of the parliamentary committee.

Big Reichsbahn Conversion.—Sanction has been granted the Reichsbahn to electrify on the standard 15-kV. single-phase system the main line from Halle to Nuremberg, and from Corbetha on this line to Leipzig, a total route mileage of 220. This will connect the Bavarian and Central German electrified systems. The estimated cost is RM. 114,000,000, including RM. 46,000,000 for new motive power and rolling stock, and the work is to be finished by the end of 1939.

Further Danish Electrification.—The Danish State Railways have asked the Government for the sum of 5,400,000 kr. for the electrification of the Copenhagen suburban system from Valby through Vanlose to Ballerup, a distance of 8·7 miles. By this electrification the two main line steam tracks from Enghave to Vanlose will be relieved of the Ballerup trains. Three new stations will be built between Valby and Vanlose. The work will not begin before April, 1936, and will not be finished until 1939.

Russian Electrification Notes.—On the Kisel-Chussorskaice section of the Perm line, which has been electrified for some time, and is worked by seven Russian-built electric locomotives of 2,750 h.p., the traffic has increased to about 2,000,000 tons a year. This line has lengthy grades of 1 in 56 to 1 in 77. The current for the Kandalaksha-Apatite-Khibin section of the Murmansk railway is to be supplied eventually by three generating stations with a capacity of 132,000 kW. which will be used for industrial purposes also. One of these has been in operation for some time and supplies the railway load of the section opened.

Big Japanese Conversion Schemes.—The Japanese Government Railways are putting in hand the electrification of the 282 miles of double line on the Tokaido route (Tokyo–Osaka) between Numazu and Kobe, and this work is to be completed by the end of 1940 at a cost of 40,000,000 yen. The section from Tokyo to Numazu, through Yokohama and the Tanna tunnel, is already electrified on the 1,500-volt d.c. system. The heavily graded route from Fukushima to Yonezawa, in the north-east of Nippon, is to be electrified also, but work will not begin until next year. This line has 17 tunnels and grades of 1 in 30–33 within a length of 27 miles. Another work is the conversion of the Suita–Kyoto line in the neighbourhood of Osaka, which is to begin at the end of this year.

New Zealand Proposals.—A £90,000 scheme for electrifying the Wellington–Johnsonville line—a 7-mile length of suburban track out of Wellington, which will cease to serve the main line when the Wellington–Tawa Flat deviation is completed—has just been decided upon by the Government Railways Board, subject to some promised legislation being passed which will give the railways a monopoly of transport in the district to be served. The chief determining factors which influenced the board in its decision in favour of multiple-unit trains as against other forms of traction were the heavy grades to be negotiated, the tunnels to be traversed, and the necessity for stops to be made at points additional to the stations at Ngaio and Khandallah, where quick deceleration and acceleration will be of great importance. There was also the fact that with the introduction of multiple-unit trains the vehicles would be available for operation on the electrified line between Wellington and Paekakariki.